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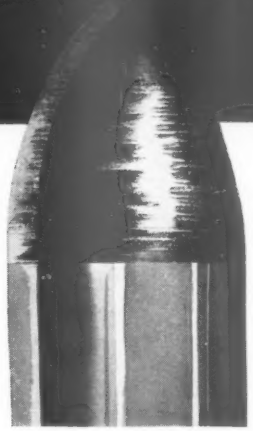

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the OIL AND GAS JOURNAL

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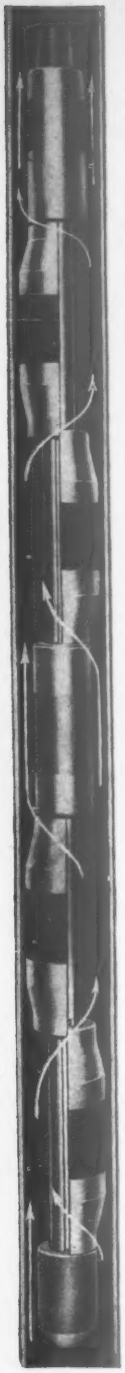
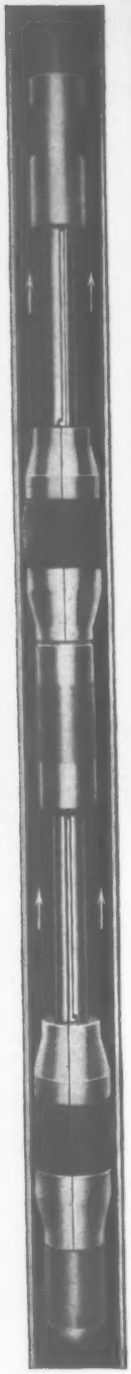


DOWNSTROKE
One-half of rubber slides upward, giving exceptionally large fluid passage between rubbers.



UPSTROKE
Rubber half drops back into position, closing fluid passage and lifting load.

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Trends

Crude-Oil Production By States — Page 94

CRUDE-OIL STOCKS 238,404,000 bbl. as of Nov. 13—up 1,467,000 bbl. One year ago 235,262,000 bbl.

GASOLINE STOCKS 68,726,000 bbl. as of Nov. 13—up 28,000 bbl. One year ago 76,028,000 bbl.

RESIDUAL FUEL-OIL STOCKS 62,647,000 bbl. as of Nov. 13—down 904,000. One year ago 78,543,000.

GAS OIL AND DISTILLATE 45,316,000 as of Nov. 13—up 540,000 bbl. One year ago 50,533,000 bbl.

CRUDE-OIL PRODUCTION 4,414,000 bbl. daily average—down 35,350 bbl. One year ago 3,915,825.

REFINERY RUNS 4,134,000 bbl. daily week ended Nov. 13—up 55,000 bbl. One year ago 3,802,000.

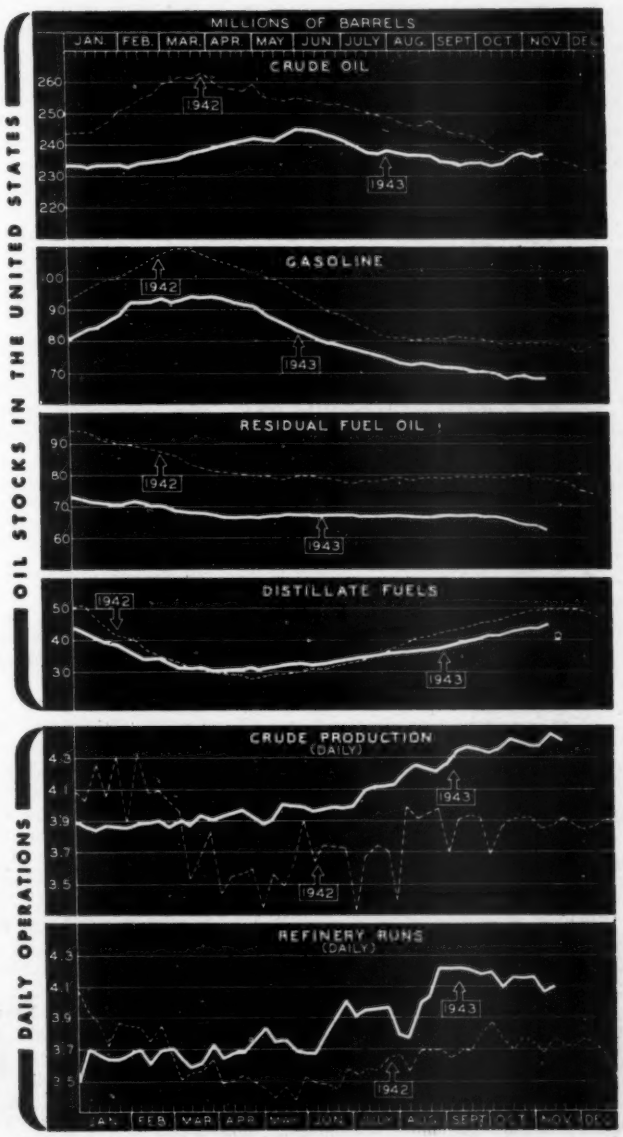
STATISTICIANS of the petroleum industry who have been been stressing the importance of enlarged imports of low-gravity crude oils and residual fuels as a partial solution to future gasoline shortages now have something definite in operating developments to point to in support of their contentions. The trend toward increased yields of residual fuel oils in domestic refinery operations which got under way immediately after Pearl Harbor, has definitely ended. The decline in these yields has been accompanied by increases in gasoline.

The changes that have taken place in the yields of the principal refinery products at domestic plants based on Bureau of Mines reports are summarized in the following table:

	Pct. yields		
Month	Gasoline	Fuel oil	Distillate
November 1941	45.2	24.4	13.4
July 1942	38.6	27.0	14.5
July 1943	36.7	30.3	13.3
September 1943	38.1	29.0	14.7

DURING the first 19 months of this country's participation in the conflict, the war agencies stressed the necessity of securing larger yields of residual fuel oil to take care of increasing industrial and emergency demands. The fact that normal shipments from the Caribbean countries were greatly reduced due to the submarine menace added to the fuel-oil burden imposed on domestic operators. The increase of nearly 6 per cent in fuel-oil yields was obtained through decreased yields in gasoline.

NOW that the shipping situation from the South American countries has greatly improved, imports of the low-gravity crudes and fuel oils to this country have increased and some of the war demands outside this country are also being taken over by oil-producing and oil-refining countries to the south. This accounts for the decrease in fuel-oil yields from 30.3 per cent in July to 29 per cent in September with a gain of 1.4 per cent in gasoline yields over the same period. How important this change is from the standpoint of gasoline supplies is apparent from the fact that had the gasoline yields in September been the same as in November 1941. 9 million barrels more gasoline would have been available during that month. While economists do not expect a return to normal gasoline yields during the emergency they are hopeful that the changes which have been under way for several months will prevent further reductions in civilian supplies.



War Department Defends Canol Project Despite Criticism of High Officials

by Henry D. Ralph

The Canol project, reviewed in this report on hearings before the Truman committee, has been one of the most closely guarded secrets of the Army although some general information has been made available in recent weeks. Many of the details, however, are disclosed for the first time in this summary of testimony November 22 and 23. Hearings were to be resumed later this week.

WASHINGTON, D. C.—The War Department vigorously defends its much criticized Canol project and only last month the joint chiefs of staff recommended that it be carried through to completion in spite of objections from many sources.

This was made plain to the Truman committee of the Senate by Undersecretary Robert P. Patterson November 23.

"The War Department is proud of Canol," he said.

The Truman committee is holding open hearings all week following much private investigation. Brig. Gen. Walter Pyron, former vice president of Gulf Oil Corp., and now the Army's petroleum adviser, was scheduled to testify later this week, along with many other Army officials.

Testimony already brought out shows that Canol was adopted very hastily on April 29, 1942, with little previous consideration and almost no consultation with experts except officials of Imperial Oil, Ltd., who expressed doubt of its feasibility. They doubted that sufficient crude would be found, pointed out that Norman Wells crude is poor for aviation gasoline, and recommended that tanker airplanes could fly out the oil much cheaper than building a pipe line. The committee also showed that many times since then the project has been criticized as useless by persons in position to know, including some in the Army, but the War Department nevertheless insisted on its completion.

The project was dreamed up, it was shown, by Frederick A. Delano, the president's uncle and chairman of the National Resources Planning Board; Dr. Vilhjalmur Stefansson, the Arctic explorer; and Dean James H. Graham of Kentucky University college of engineering, personal friend and $1 a year adviser to Lt. Gen. Brehon Sommervell. General Sommervell signed directive to construct Canol same day he received a one-page memorandum from Graham recommending it.

Patterson and Graham defended Canol before the committee on the ground that Japan threatened Alaska directly after Pearl Harbor and immediate action was needed for defense and Canol was only an incident in Alaska Highway and general defense plans and there was no time for thorough study. Also that development of any local supplies of oil regardless of cost was well worth while to save the drain on United States resources and reduce hazards of ocean shipping.

Patterson could not explain why chiefs of staff still want project completed or whether they considered all the objections now being revealed by the Truman committee.

The committee so far has brought out evidence indicating that Canol is an undesirable project, and apparently has much more evidence of the same nature. For example, the committee counsel, Hugh Fulton, quoted the chief of Army Engineers, General Robbins, as saying 10 times the volume of oil could be supplied Alaska from United States at one-tenth the effort of Canol. He also quoted from letters of Standard Oil Co. of California, employed by the Army as expert consultants on Canol, twice recommended that the project be dropped and the Alaska Highway be fueled by pipe lines supplied by rail and water from the United States.

Patterson said the entire project will be in operation by next spring and will prove to be of great value to the war. While admitting it was not conceived as an economical project for peacetime he said the development of 20,000 bbl. daily of crude-oil production at Norman Wells, compared with 400 bbl. before the war, will be of great value to the United States and Canada later and may justify the cost. He insisted on describing Canol as a success and a sound project from the Army's angle.

The Army's $134,000,000 Canol project was roundly condemned November 22 by Petroleum Administrator Harold L. Ickes, Budget Bureau Director Harold D. Smith, and H. Leroy Whitney, technical consultant to the chairman of the War Production Board.

They revealed an almost fantastic story of the Army's insistence on going through with the project despite the strongest kind of objections from PAW and WPB that it was technically and strategically unsound, a gross waste of money, materials and manpower, a hindrance to the war effort, and contrary to the best interests of the United States.

For more than a year the Army refused to consult with any other agency of the Government or even reveal the slightest information about the project on the grounds of military security, and refused to tell the Budget Bureau how much it was spending.

The hearings brought out much information about Canol which has not been revealed previously. The Truman committee also has many documents on Canol and is expected to publish a report revealing additional information.

As pictured by witnesses, who admitted they had not been able to obtain all the facts, the Canol project involves contracts with the Canadian Government and Imperial Oil, Ltd., a Canadian affiliate of Standard Oil Co. (New Jersey), to develop 20,000 bbl. of daily production in the Norman Wells field and explore for oil in 600,000 sq. miles of the Canadian Northwest, the United States to pay $1.25 per barrel for oil at the well for the first 1,500,000 bbl. and then 75 cents per barrel.

Bechtel-Price-Callahan has a contract to construct a 550-mile, 4-in. pipe line from Norman Wells to White Horse, at the head of the railway from Skagway, with a capacity of 3,000 bbl. daily. The Army is constructing a 3,000-bbl. refinery at White Horse, originally designed to use the Houdry cracking process to yield some 1,500 bbl. daily of aviation gasoline, now redesigned for thermal cracking

(Continued on page 35)

Acme photo.

The combination of Allied bombers and Nazi demolition squads left this shambles of the oil refinery at Naples which, before the war, was operated by Raffineria de Napoli, S.A.I. (Socony-Vacuum) and included one of the few Houdry catalytic cracking units in Europe

THIS WEEK

PRODUCTION—Record production quota of 4,694,200 bbl. daily assigned oil states next month. . . . Productivity is only limiting factor in most states. . . . Nearly 30 per cent of net increase expected from natural gasoline and condensate production. . . . Quotas in some areas based on speculation, include expected yield from untested discoveries. . . . All certifications, except to Texas and Rocky Mountains, coincide with productive capacity. . . . ¶Sohio Producing Co., Union Oil Co. of California figure in week's purchase of independent producing properties. . . .

REFINING—Secretaries Knox and Stimson urge PAW to speed completion of 100-octane plants, say this factor most critical of all in military program. . . . ¶District 2 plant operators attempting to drawoff WEP crude at Norris City, contend equivalent amounts could be made up on East Coast by imports, coastwise shipments. . . . PAW admits discussion of possibility, says no decision reached. . . . ¶Forty 100-octane plants now under construction engaging 44,000 workers, highest payroll for this branch in history of industry. . . . Shell Oil Co. Inc., dedicates new 100-octane installation on Pacific Coast. . . .

TRANSPORTATION—Eastern extension of WEP crude-oil line operated at capacity for first time, handles 301,500 bbl. in 24-hour period. . . . ¶J. R. Parten resigns as PAW director of transportation. . . . ¶Administrator Ickes hints at possible movement of Elk Basin and Frannie crude via tank cars, west to Idaho and Washington, east to Chicago. . . . ¶Shipments from Atlantic Refining Co.'s new 75-car rack at Midland, Tex., started, destined for Philadelphia delivery. . . . Rail movement from West Texas to District 2, pending approval of reimbursement for higher costs. . . .

ADMINISTRATION—Representatives of PAW, WPB and Budget Bureau condemn Army's Canol project in Northwest Territory of Canada, recommend abandonment to save $30,000,000 cost of completion. . . . ¶Petroleum Reserve Corp. rumored to be dealing for disputed strip separating Kuwait and Saudi Arabia. . . . ¶Three members of PRC's Middle East commission reported in Arabia, fourth representative, Abe Fortas, resigns to reenter Navy service. . . .

DRILLING—Slight increase noted in October completion rate. . . . Deep wells, below 10,000-ft. completions, at highest level attained since May 1942. . . . ¶Contractors circularized for specific information on shutdown rigs, leaving inference that PAW expects to supply more of necessary materials. . . . ¶Manpower shortage chief limiting factor in certain California fields, growing more critical.

PRICES—Petition to release Disney bill from committee is given required number of signatures, bringing crude-oil price issue to floor of House. . . . Sponsors of move to gain congressional action chiefly concerned over Senate attitude. . . .

Oil Operators Unanimous in Opposing U.S.G.S. Proposal for Unitization

by Tolbert R. Ingram

DENVER, Colo.—Oil men from Kansas and Oklahoma to California who came to Denver to attend a hearing on proposed rules and regulations governing unitization called by the U. S. Geological Survey were in practical unanimity on a number of major proposals.

They favor such agreements for the orderly development of fields as units for the conservation of resources and the prevention of waste, but believe these should be through voluntary agreements among the owners of leases and rights and not by mandatory laws or rules and regulations.

The owners of property rights, oil men asserted, who make investments in them, assume the risks, and take their chances should have the power to determine the form of agreements, the areas to be included in the units, and the methods of developing and operating them, and not be required to turn these rights over to others to exercise their authority at their discretion.

The proposed rules and regulations as revised, the operators conceded, are much better than those submitted to the oil men last April, but they still are unacceptable, and in their present form they would tend toward the regimentation of the industry under governmental control without recourse. Unless extensively modified, it would be impossible to find any operators who would accept the proposals.

Government land within the units, the consensus held, should be treated the same as state and private land, the Government itself being only a royalty owner making no investment for development and its situation being similar to that of all other parties to the agreement. The proposed form, with the suggested rules and regulations, witnesses claimed, would give the Government supreme control even though its land within the units is but a small fraction of the total.

Producers' Views Sought

The administrative heads who came from Washington to lay their proposals before the oil men, get their views, and consider the suggestions offered before promulgating the rules and regulations, were commended for the apparent willingness to cooperate in reaching a full understanding.

The hearing, which began in Denver November 17, was called by the U.S.G.S. with the approval of Harold L. Ickes, secretary of the interior. Oscar L. Chapman, assistant secretary of the interior; H. B. Soyster, chief of the conservation branch of the U.S.G.S.; John F. Deeds, chief engineer for the survey, and Joel Wolfsohn, assistant commissioner of the General Land Office, accompanied by a staff of assistants, came from Washington to attend the hearings.

Almost all the oil companies which operate in public-domain states, the oil and gas associations, and state governing bodies, sent representatives.

Prior to the meeting, the U.S.G.S. printed and distributed to those interested a code of proposed regulations for the development and operation as a unit of oil or gas areas, fields or pools, involving public land as revised October 1943. Accompanying the code was a proposed form of unit agreement. These documents contained revisions based on suggestions from oil men sent to the survey following the distribution of a preliminary set of regulations and form submitted to them last April.

Mr. Chapman, in his opening statement, emphasized that the regulations now before the oil men for consideration are tentative proposals only, and that he wanted to make that fact as clear and emphatic as possible.

"I have doubts as to the wisdom of many aspects of the regulations," he said, "doubts which I hope will be resolved by you here today."

124 Plans in Operation

He stated that currently there are 124 such plans in force covering a gross area of 1,692,893 acres. Half of the crude oil, as well as 62 per cent of the natural gas and gasoline produced from public land, is obtained under these plans. The outstanding approved plans do not follow any fixed pattern. The signatory parties have entered into a binding contract to waive their common-law right to recover petroleum by drainage from each other's property and have agreed collectively to operate under a single plan of development to reduce their costs of operation and increase the recovery of natural resources.

Clarence Hinkle, of Roswell, representing the New Mexico Oil and Gas Association, relinquished his time to H. R. Rogers, New Mexico commissioner of public lands, and John M. Kelly, state geologist, and a director of the New Mexico Oil Conservation Commission. Mr. Rogers stated that 40 per cent of New Mexico's produc-

H. B. Soyster, chief of the U.S.G.S. conservation branch; Oscar L. Chapman, assistant secretary of the interior, and John F. Deeds, chief engineer for the U.S.G.S.

tion comes from state lands, 40 per cent from federal lands, and 20 per cent from fee lands. New Mexico has 13,000,000 acres of state lands which it received under the enabling act, and the proceeds from these lands are set up in trust funds for the benefit of the schools. He, as trustee of these lands, has been empowered by the legislature to enter them under cooperative agreements and is ready to do so when it is of benefit to the state. But he declared that he will not enter state land with federal land if the state has to surrender control or in any way has to relinquish any of the duties or obligations imposed by law. Any unitization or cooperative agreement involving federal lands should be carried on by the Conservation Commission.

Mr. Kelly outlined the method by which the commission promotes conservation, prevents waste and prorates production under operators' agreements and not as units. He referred for example to the Hobbs field, which has had a voluntary operators' agreement since 1930. He said it was recognized as one of the best-operated fields in the country, and although it has produced more than 140,000,000 bbl. of oil, 87 per cent of the wells are still flowing. It is not operated as a unit, but under an agreement among the operators. The position of the state, he said, was that it does not feel it could enter its property into the kind of unitization or cooperative agreement proposed by the federal agency because it does not safeguard the interests of the state.

California Suspicious

Robert M. Allen, Jr., representing the Conservation Committee of the California Oil Producers and the San Joaquin Valley Oil Producers Associations, said the committee had been greatly disturbed over the proposed type of regulations the U.S.G.S. proposes to put into operation.

"California," he said, "is not what is considered a public-land state, yet nearly 50 per cent of the Government's direct revenue from oil and gas comes from California. We are vitally interested in the proper development of government-owned oil and gas land in our state, with or without unitization, but we haven't been able to convince ourselves, as yet, that to properly develop our fields or to promote unitization that we must hand over to the secretary of the interior, or any one else with dictatorial powers, control of our fee and state land. We in California have good reason for being fearful of what can happen when one man is set up as prosecutor, judge and jury."

He followed with a detailed discussion of the objections to the proposed regulations, referred to the past record of the difficulties with Washington and pointed out that the secretary already has all the authority needed over federal leases and new regulations are not necessary.

R. S. Shannon, chairman of the District 4 production committee; Sen. Joseph C. O'Mahoney, of Wyoming; John Brice, vice president of Carter Oil Co., Tulsa, and Ralph Damp, Carter's Rocky Mountain district manager

"If unit agreements could be prepared and agreed upon by the parties on a voluntary basis and submitted to the secretary for approval, and if the secretary adopted a reasonable attitude in giving or withholding his approval of such agreements, unquestionably the cause of unitization would be promoted," he said.

The hearings in Denver, he declared, was strictly a "selling" proposition and represented not a change in heart but in tactics.

Directors of the Rocky Mountain Oil and Gas Association put that organization on record against the proposals in a letter submitted by B. B. Brooks, president. It pointed out that Wyoming was a pioneer in unitization, being one of the first under the temporary act of 1930 to form a unit. The state now has more unit plans involving federal land than any other Rocky Mountain state. No two are exactly alike in form and are so radically different there is no room for comparison. It urged the model form proposed by the U.S.G.S. be discarded. Another hindrance pointed out is the great supervisory control of the secretary of the interior. No difference how small the United States' interest, the entire unit will be placed under control of the secretary or the U.S.G.S. and there is a question of the legality of the state turning its land into a federal-controlled unit.

The Rocky Mountain association is a trade group composed of 67 members including most of the large and small operators in Wyoming. Units in that state are largely federal land, there being comparatively little state and fee land.

N. M. Baird presented a brief on behalf of the New Mexico Oil and Gas Association, all the members of which have been engaged in the oil and gas business for 15 years as practical operators for themselves or for companies under federal leases. It stated all had tried to familiarize themselves with the proposed rules and regulations as modified, and every member has protested their adoption. It held up the state oil conservation commission as a regulatory body which would serve as a model for all other states. He said the powers imposed in the secretary are so great they did not care to risk their capital to be turned over to him, and it was pointed out that in many instances capital had turned down large blocks in New Mexico because they necessitated drilling on the public domain. Suggested changes included the proposal that unitization should not be compulsory, regulations should not contain details of agreement, which should be left to the owners and operators, and that the U.S.G.S. rather than attempt to control should aid by making available information obtained from other operators on the public domain and the benefits derived from unitization.

Change Called Unnecessary

W. L. Holloway, representing Honolulu Consolidated, Doheny, Seaboard and other interests, opposed the proposed regulations as unnecessary and said that the 124 agreements cited by Mr. Chapman confirm his conclusion that present forms and methods are sufficient.

Mr. Downing, representing the Interstate Compact Commission and a group of Rocky Mountain oil men, protested that the Government was putting everything possible in the way of the independent wildcatter and that the policy which would be adopted in the unit agreements would put the independents in a straightjacket. The wildcatters and the independent pioneers, he said, abhor the regulations. Between January 1, 1936, and July 1, 1943, 21,000 wildcats had been drilled but only four of these were in Colorado, three in Montana,

(Continued on page 30)

Development Work Spreads In Black-Oil Horizons of Big Horn Basin, Wyoming

by Nell Williams

EXPLORATION and development of the "black" oil-producing horizons on the various known structures of the Big Horn basin in northwestern Wyoming continues to spread. Inspired by wartime-petroleum needs which have created greatly increased demands for heavy oil as well as light-gravity crudes, the activity is resulting in the proving up of important new reserves. These are establishing this region as a major producing area and, with extensive potentialities remaining to be exploited, are expected to contribute materially to relief of the country's growing shortage of crude.

"Black" oil of this district typically is a low gravity, usually about 20° to 22° Be., asphaltic-base crude. It is characteristic production of the stratigraphically older and deeper horizons of the district which are represented mainly by the Embar lime of Permian age, the Tensleep and Amsden sands of the Pennsylvanian, and the Madison lime in the Mississippian. Until now the "black" oils have been used chiefly for road oils and heavy fuels. With limited markets, mostly local, and low prices, there has been little inducement for general development of this type of production.

Shallow Pays First Developed

Consequently, much of the earlier drilling work was directed to exploration of the shallower horizons which on a number of the structures have been found productive of considerable gas and some light-gravity oil. On many of the structures no attempt has been made to drill to the deeper formations. Where the latter have been drilled and "black" oil found, or indicated, development in most instances was confined to a comparatively few wells. Some of these never have been produced.

Light oil potentialities of the shallower and younger formations on most of the known structures of the region have been fairly well exploited over a period of years. The black-oil reserves of the deeper horizons now constitute the major potential source of new production to be developed. The known structures now being exploited are only those that are conspicuously evident on the surface, being located around the rim of the basin. Other possible more important reserves of both light and heavy oil may exist on buried structures yet to be found which are believed to exist in the basin. However, difficulties entailed in their exploration and discovery may prevent them from being disclosed for some time to come.

The present exploration program consists of going back on the many known structures fringing the basin and drilling to the deeper horizons. There are now upwards of 35 active operations with others scheduled to be undertaken in the near future, spreading the development to an additional number of structures. The Big Horn basin is not only the most active area in the Rocky Mountain district, but also one of the most active in the country.

Indicative of the possibilities of the lower horizons on some of the structures is the prolific production that has been proven this year from the Tensleep formation in the Elk Basin field, located on the Wyoming-Montana line at the north end of the basin. A productive area of approximately 6,000 acres already has been established within an indicated structural closure of 1,600 to 1,700 ft. Total reserves from this formation of Elk basin now are estimated at upwards of 300,000,000 bbl. The discovery well was completed a year ago, and since then 18 wells have been completed, despite slow and difficult drilling conditions. Daily production, greatly restricted by lack of pipe-line outlets, has been increased to approximately 15,000 to 18,000 bbl., and by next spring is expected to be up to 25,000 bbl. Depth of the Tensleep in this field ranges from about 4,400 ft. on top of the structure to below 5,300 ft. in down-dip wells.

Significant is the fact that in the

Portion of the prolific Elk Basin field looking toward the northern rim

fields in which the deeper formations have been proven, the productive areas, especially in the case of Tensleep sand, are substantially greater than the areal extent of the shallow sands on the same structures. At Elk Basin, production in the shallow sands covers an area of less than 1,200 acres. In other fields similar area relationships exist.

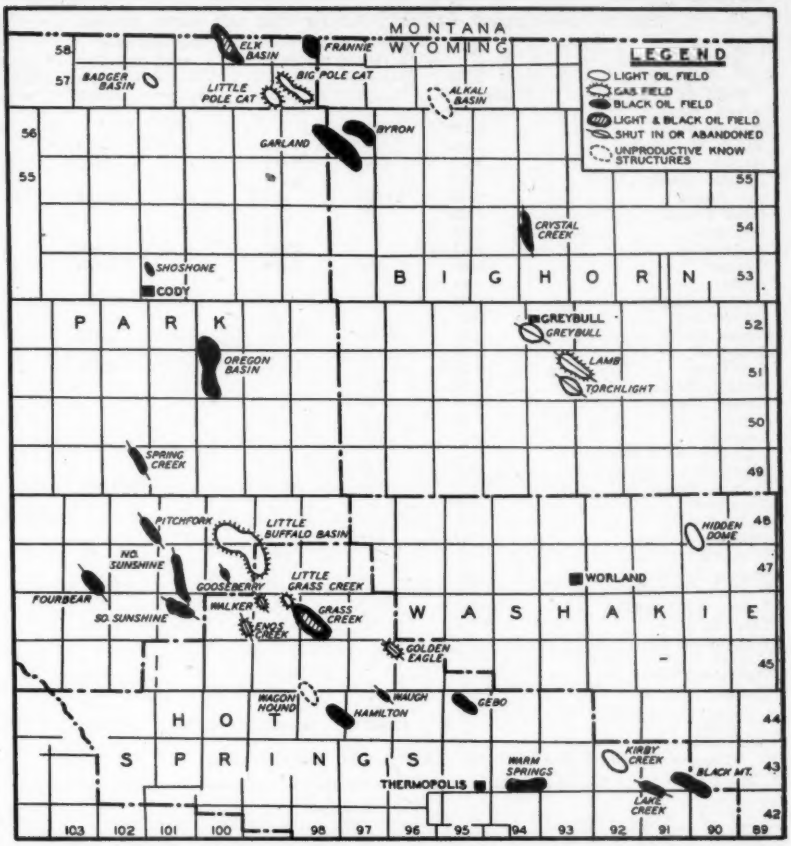
Of further significance at Elk Basin is the fact that the Tensleep oil has a gravity of approximately 30° Be., as compared with the gravity of from 20° to 22° Be. of oil which has been found in the older formations in most of the other fields. The higher gravity oil also has a gasoline yield of approximately 27 per cent on straight distillation. Very little, if any, gasoline has been obtained from the lower gravity oils. This opens the possibility that the Tensleep and other older formations on some of the other structures yet to be developed may produce a similar light-gravity oil.

Embar Gives New Incentives

New incentive for exploration of the lower horizons has been given lately by the discovery of what appears to be another important field from the Embar lime and possibly from the Tensleep sand on the Gebo structure at the south end of the basin in Hot Springs County, near Thermopolis. The discovery well, Continental Oil Co. 1 Gebo, now drilling deeper in the Tensleep, made a series of drill-stem tests in the Embar lime, topped at 4,735 ft., in which impressive quantities of pipe-line oil were recovered. In a 15-minute test at 4,737-84 ft. it recovered 7 stands of oil, and in another at 4,787 to 4,845 ft. it recovered 23 stands of oil and 22 stands of oil and gas-cut mud. As in the case of Elk Basin's Tensleep oil, the gravity of the oil at Gebo is 30° Be. Tests so far in the Tensleep have not been so encouraging. Although Gebo is a well-outlined structure, typical of the other large surface features around the rim of the Big Horn basin, and known for many years, it never has been prospected except for one shallow test drilled several years ago.

Of particular interest at this time is the Little Buffalo basin structure on the Park-Hot Springs County line on the west rim of the basin, where two deep tests are drilling at critical depths. This structure, one of the largest and most pronounced of the basin, is about 12 miles long and about 3 miles wide. It has been producing gas for many years from shallow sands, but except for the two tests now drilling, one by Stanolind Oil & Gas Co. on the north end and the other by Fred Goodstein on the south end, never has been drilled to the lower horizons. From the beginning, however, it has been regarded as a "sure-shot" for deep production.

A major handicap for large-scale development in the Big Horn basin is the absence of pipe-line outlets. Several of the fields have small lines to local refineries, but there are no lines going outside the district. Movement of the bulk of the production, even within the district, has been dependent upon tank trucks and tank cars. Although these facilities are handling an appreciable volume of oil, they are inadequate to take care of the increasing production being built up and the growing demand for the oil from outside markets. As a result there is a substantial volume of production in a number of fields now either totally or partially shutin that could be made available to meet the country's expanding needs.



Fields and known structures outlining the rim of the Big Horn Basin

Work is expected to be started shortly by Yale Pipe Line Co. on an 8-in. and 6-in. pipe line recently approved by WPB to be laid from the Elk Basin and Frannie fields to refineries at Billings and Laurel, Mont., which will provide needed relief for these fields. A discussion of potential service by the Yale pipe line appears on page 86. In the Frannie field, about 12 miles east of Elk Basin, approximately 2,000 bbl. of daily production are shutin lacking on outlet. The approved line will have a capacity of 15,000 bbl. daily.

Another line, now pending approval, has been proposed by Stanolind Pipe Line Co. to be laid southward from Elk Basin to Casper, Wyo., where it will connect with the company's trunk line to the east. This line if laid, will follow a route, along which are located a number of important fields of the Big Horn basin, and will provide the first interdistrict pipe-line outlet for the area.

Thirty structures of the Big Horn basin, not including Gebo, where the discovery well still is drilling, have been found productive of oil or gas, or both, and have yielded a total of

This is the third of a series of articles on Rocky Mountain operations. It deals specifically with current developments and prospects in the Big Horn basin. Articles by the same author on operating practices in the Elk Basin field and on dehydration of gas in the district as a whole where subfreezing temperatures are common appeared in the November 4 and 18 Journals.

FIELDS AND KNOWN STRUCTURES OF THE BIG HORN BASIN

Field or structure—	Year discovered	Accumulated prod. (thous. of bbl.) Light	Accumulated prod. (thous. of bbl.) Black	Current prod. (bbl. daily) Light	Current prod. (bbl. daily) Black	Drilling wells
Alkali Basin	....	.....	.....	.....	.....	1
Badger Basin	1930	494	.....	100	.....	1
Black Mountain	1922	.....	239	.....	70	...
Byron	1918	.....	8,887	.....	7,500	2
Crystal Creek	1919	.....	(†)	.....	.....	...
Elk Basin	*1915	11,674	450	430	16,000	16
Enos Creek	1923	(‡)	.....	.....	.....	...
Fourbear	1928	.....	4	.....	.....	...
Frannie	1928	.....	7,998	.....	2,400	2
Garland	1906	584	5,406	.....	1,250	1
Gebo	1943	.....	.....	.....	.....	1
Golden Eagle	1921	(‡)	.....	.....	.....	1
Gooseberry	1937	.....	21	.....	.....	...
Grass Creek	1914	27,905	4,166	1,575	2,550	...
Greybull	1907	(†)	.....	.....	.....	...
Hamilton	1918	.....	6,259	.....	1,250	...
Hidden Dome	1918	369	.....	40	.....	...
Kirby Creek	1918	36	.....	15	.....	...
Lake Creek	1925	.....	1	.....	.....	...
Lamb	1913	(‡)	.....	.....	.....	...
Little Buffalo Basin	1914	(‡)	.....	(‡)	.....	2
Little Grass Creek	1917	(‡)	.....	(‡)	.....	1
Oregon Basin	*1912	(†)	7,199	.....	16,300	6
Pitchfork	1930	.....	(†)	.....	.....	...
Polecat (Big)	1916	(‡)	.....	(‡)	.....	...
Polecat (Little)	1922	(‡)	.....	(‡)	.....	...
Shoshone (Cody)	1910	.....	108	.....	80	...
Spring Creek	1929	.....	(†)	.....	.....	...
Sunshine (North)	1928	.....	(†)	.....	.....	...
Sunshine (North)	1926	.....	(†)	.....	.....	...
Torchlight	1913	(†)	.....	.....	.....	...
Wagonhound	....	.....	.....	.....	.....	1
Walker Dome	1930	(‡)	.....	.....	.....	...
Warm Springs	1917	.....	452	.....	100	...
Waugh	1934	.....	211	.....	.....	...
Total		41,062	41,451	2,160	47,500	35

*Discovery date of shallow light-oil production. †Small. ‡Gas.

more than 82,500,000 bbl. of oil, about equally divided between black oil from the lower horizons and light oil from the shallow sands. Of these 17 have been found productive of black oil, but only 10 are now producing regularly.

Black oil production from the district now amounts to more than 47,500 bbl. daily, and it is estimated that this volume can be nearly doubled within the next several months if transportation facilities are provided. Light oil production which never has been large, amounts to about 2,200 bbl. daily, chiefly from the Grass Creek field, Hot Springs County, now producing 1,575 bbl. daily. The latter field also is producing 2,550 bbl. of black oil.

Lend-Lease Oil Exports to U.S.S.R. Totaled 500,000 Tons in 24 Months

WASHINGTON, D. C.—Shipments of 500,000 tons of petroleum products, totaling 3,500,000 to 4,000,000 bbl., to Soviet Russia under lend-lease operations to the end of September were disclosed here last week by Leo T. Crowley, director of the Foreign Economic Administration. The FEA report gave no details on the petroleum shipments but it served as one tangible figure in an otherwise completely obscured picture of oil exports.

Mr. Crowley reported that industrial items sent to the U.S.S.R. have included more than 1,000,000 tons of steel and steel products; more than 300,000 tons of nonferrous metal; 300,000 tons of chemicals and explosives and more than 17,000 metal cutting machine tools in addition to the petroleum exports.

"The stepped-up flow of aid is indicated," an FEA release stated, "by the fact that more than half of the total lend-lease aid to Russia was sent during the first 9 months of 1943. The remainder was provided in the preceding 15 months."

If the general breakdown of shipments to Soviet Russia also applies to petroleum, American oil exports to the U.S.S.R. in the first 9 months would have totaled 1,750,000 to 2,000,000 bbl., or an average of around 7,000 bbl. daily.

A substantial volume of the steel shipped to the Soviet Union consisted of oil-field equipment but the FEA report does not disclose specific figures. Recently, a Soviet purchasing mission visited most important oil-field equipment manufacturing centers in the Middle West and Southwest and contracted for substantial volumes of supplies, including portable drilling rigs, drilling engines, compressors, pipe and a full range of auxiliary items.

Sohio Producing Buys Illinois, Indiana Property

CENTRALIA, Ill.—Sohio Producing Co. has purchased the properties of the W. W. Gray estate in Illinois and Indiana for a reported cash consideration of $1,200,000. Robert Moore of Grayville, who has been in charge of the Gray firm's production, has been made assistant superintendent of production by the Sohio company under Virgil Sims, who will supervise all of Sohio's production activities.

The W. W. Gray estate's oil holdings included 60 producing wells, producing about 700 bbl. per day.

PAW Office to Stay in Tulsa Director Vandeveer Says

The Tulsa office of the Petroleum Administration for War will be retained "so long as the emergency lasts," W. W. Vandeveer, director in charge, assured 150 producers, suppliers, refiners and purchasers meeting in Tulsa last week to obtain authoritative information concerning rumors that the office was to be closed. Mr. Vandeveer said the rumors were unfounded.

Work of S. R. Clinkscales, materials head, who has resigned, was praised by Mr. Vandeveer, and the oil men were urged to recommend a successor. He also commended C. C. Brown, assistant director of production, and Mark S. Patton, director of natural gasoline.

Wearied by Delays, Interior Official Joins the Navy

WASHINGTON, D. C.—Abe Fortas resigned as undersecretary of the Department of the Interior last week and entered service as an apprentice seaman of the Navy. Declaring he was eager to get into active war service, he reported for duty and left Washington for his training. He also resigned as chief of the Petroleum Reserve Corp. mission to the Near East.

Mr. Fortas, after being inducted into the Navy a few weeks ago, was given a leave at the request of Interior Secretary Ickes to undertake a middle eastern survey of petroleum facilities for the PRC.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

All the Facts Necessary

THE domestic oil industry must produce a minimum of 4,694,200 bbl. daily of petroleum liquids next month, according to the latest PAW projection. Of this total 4,425,100 bbl. daily is to be crude oil and the remaining 269,100 bbl. natural gasoline and associated products.

This will mean another record in the monthly production of raw materials and it must be accompanied by a corresponding increase in output from the industry's manufacturing facilities. New records in domestic operations have been necessary from month to month since September and further expansion is scheduled through 1944.

Representatives of the industry and PAW closest to conditions, are confident that, barring developments not foreseen at this time, domestic operators aided by increasing imports will be able to supply the expanding needs. Construction schedules in refining and transportation and the availability of additional crude oil from certain areas, are stressed.

But PAW and the industry's committees should go further in these projections on future petroleum demands. Their reports should explain not only how much oil is to be produced from existing wells and how it is to be transported and refined, but also how much new oil is being found.

Next month's production will be 58,500 bbl. greater than it was this month, an increase of approximately 21 million barrels yearly. To support this enlarged field output over a period of 15 years requires a new reserve of 300 million barrels.

Recent discoveries have not furnished this backlog for the December expansion by a wide margin. The same situation applies to all the other increases in demand and output so far this year.

This deficiency is clearly revealed when known crude-oil reserves are evaluated in terms of years' supply. Taking the approximate 20-billion-barrel figure commonly used and today's reserve based on the December production represent 12.4 years' supply. This same reserve in relation to the demands of a year ago was 14 times the yearly needs. Should domestic crude-oil output be expanded to 4,750,000 bbl. daily a year from now, a 20-billion-barrel reserve would be equal to 11.5 years' supply.

These years' supply comparisons are of value only in showing the declining trend in reserves, which are in fact underground working stocks and should be analyzed in that light.

The petroleum industry and its war agency have a duty to perform in keeping the entire country informed currently as to the status of crude-oil inventories in place as well as those aboveground. The most important link in the operating chain is now being ignored. When 100,000 bbl. daily are added to demands the public should be told that only a small part of the half-billion-barrel new supply required to support that additional requirement is being found.

Part of the difference between discoveries and production is coming from fields which are sacrificing ultimate recovery. The remainder represents crude oil which normally would be produced 5 to 15 years from now when it will be needed to maintain postwar operations.

Nothing is going to be done about price and the other operating needs of the petroleum industry until consumers realize in the war expansion the superstructure of petroleum is being added to while the foundation of new oil is being weakened. An informed public acting through its legislative representatives can and will reverse this procedure.

District 2 Refiners Seeking Share of WEP Crude Supply

by H. Stanley Norman

EXISTING refining facilities in District 2 are capable of handling approximately 40,000 to 42,000 bbl. of high-sulfur crude oil, it is disclosed in a survey of qualifications recently completed by the Petroleum Administration for War.

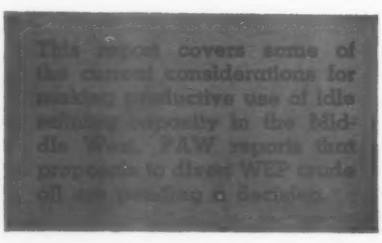
The PAW investigation which was conducted under the direction of the District 2 division of refining was one phase of the analysis of how full capacity of Middle West plants could be incorporated in the war manufacturing program. District 2 refiners currently are operating at approximately 200,000 bbl. daily below their maximum capacity.

Negotiations are under way to make maximum use of sour crude oils from West Texas which would be transported into District 2 via railroad tank cars, pending completion next spring of Stanolind Pipe Line Co.'s new pipe line from Slaughter, Tex., to Drumright, Okla. Start of rail movement from West Texas to District 2 refiners is pending approval of compensatory freight rates by Defense Supplies Corp., a subsidiary of Reconstruction Finance Corp. Formal approval of paying the difference between established and computed pipeline tariffs between shipping terminals in District 3 and refinery docks in District 2 was to have been issued by DSC 2 weeks ago but the matter was still under consideration this week. Rumors circulated from Washington, D. C., that one or two large refiners had advised DSC that no compensatory payments were justified and this assertion was being investigated.

The average cost of shipping from Midland, Tex., to District 2 refiners via railroad tank cars above pipeline tariffs has been determined to be 13 cents per barrel. The District 2 PAW organization was compelled to establish arbitrary pipe-line rates between Midland, Tex., and Mid-Continent refineries where no published tariffs existed in order to arrive at a reasonable cost differential. Sufficient published tariffs are of record, however, to remove most of the guess work from calculations. A strong probability exists that a yet-undetermined percentage of crude oil run through the WEP 24-in. line will be diverted at Norris City, Ill., or more southern points for refining in District 2 plants. District 2 refiners assert that much of the idle manufacturing capacity in the Middle West can be woven into the scheme of war processing by diverting WEP crude and by making up for whatever volume is stopped in the Mid-Continent by imports on the East Coast and with coastwise shipments from Texas.

Stoppage of any part of the WEP 24-in. line throughput short of its maximum delivery point, of course, will have a tendency to increase the per-barrel costs of operating the system. It has not been determined just how costs will be affected by the drawoff of WEP crude at Norris City because this factor will be influenced by the volume diverted to the Middle West. WEP transportation costs under the recent operating schedule of 300,000 bbl. daily to Norris City and 225,000 bbl. daily through the eastern extension have been roughly 15 cents per barrel, compared with tanker costs of about 75 cents a barrel, including insurance.

The difference of approximately 70,000 bbl. in the daily average receipts of WEP crude oil at Norris City and the shipments through the eastern extension has been split into two categories for forwarding. About 40,000 bbl. daily have been shipped from Norris City to eastern refineries via tank cars. The other 30,000 bbl. have been delivered to Enfield, Ill., and picked up there by Ohio Oil Co. Traffic handled by Ohio Oil Co. lines has been loaded at other tank-car terminals at Martinsville, Ill., and other points for eventual shipment by tank cars to eastern plants. When the eastern extension is in full operation most of the temporary tank-car movement will be stopped.



Increases in East Coast receipts of petroleum either from Texas ports in coastwise shipments or from South America in exports, a development made possible in recent months by additions to the tanker fleet and successful defenses against submarine warfare, have permitted a reappraisal of the overland transportation program. Middle West plant operators insist that changes in the shipping conditions have removed certain aspects of the previous necessity that WEP facilities be used exclusively to supply crude oil to East Coast refineries. Furthermore, the declines in productivity in District 2, the plant operators contend, have made it impossible for their refineries to supply maximum products for military and essential civilian consumption unless available crude oil is supplemented by a fixed percentage of WEP crude oil traffic.

Knox and Stimson Urge Haste on 100-Octane Plants

WASHINGTON, D. C.—Petroleum Administrator Ickes this week received letters from Secretaries Stimson and Knox, of the War and Navy departments, respectively, urging accelerated progress in completion of 100-octane plants, described as one of the most serious problems confronting the military forces.

Interference by military authorities in the shipment of necessary equipment to certain of the 100-octane refining units, it was declared here, is the chief cause of delay in construction and completion. Only 2 weeks ago were top priority ratings extended to several of the unfinished 100-octane plants.

Parten Resigns as Chief of PAW Transportation Division

WASHINGTON, D. C.—Jubal R. Parten has resigned as PAW director of transportation to resume activities as president of Woodley Petroleum Co. of Houston and chairman of Premier Oil Refining Co. of Longview, Tex. Administrator Ickes and Deputy Administrator Davies issued statements expressing regret at his departure and praised his work in developing the oil transportation system to the East Coast. Mr. Parten's successor had not been designated.

S. F. Pratt Resigns as Penn Grade Secretary

OIL CITY, Pa.—Resignation of Samuel F. Pratt as general secretary of the Pennsylvania Grade Crude Oil Association was accepted here November 23 at a meeting of the board of directors.

FOURTEEN YEARS!

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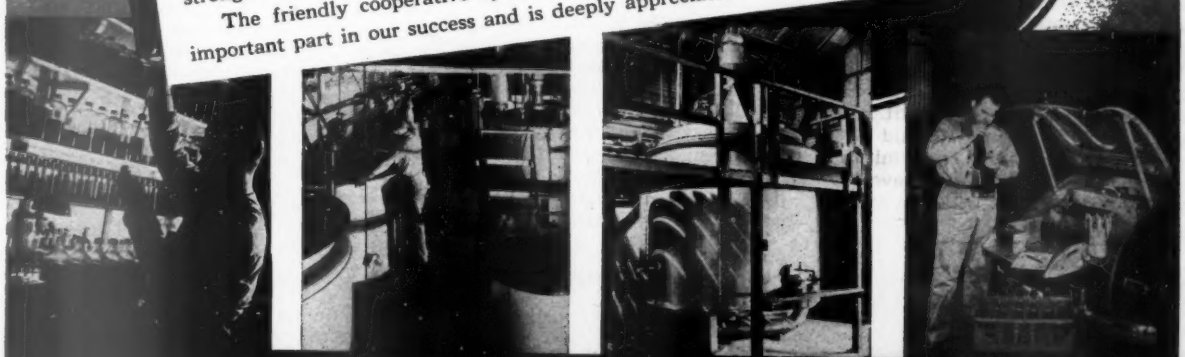
We are proud of the important part these products have played in such an essential industry in wartime, and will continue to build for a stronger and better future in the peaceful years to come.

The friendly cooperative spirit of our customers has played a very important part in our success and is deeply appreciated.



VISCO

The Modern Emulsion Breaker

VISCO PRODUCTS COMPANY, INC., Houston, Texas

Oil Operators Oppose U.S.G.S. Proposal

(Continued from page 23)

four in Utah and 26 in Wyoming. On the basis of regional possibilities, Wyoming should have had 433 wildcats in that period with proportionate discoveries.

Dean Terrill, Oklahoma City, representing the Mid-Continent Oil and Gas Association, submitted a memorandum brief on behalf of the Kansas-Oklahoma division of the association.

"It is submitted," the brief concluded, "that regulations giving the Government and its representatives a reasonable voice in the management of a unit will be agreeable to the industry, but that regulations such as those now proposed, which make the Government the sole arbiter, will not be acceptable, and such regulations will defeat the Government's laudable effort in the promotion of unit operations."

George W. Cunningham, general counsel for Shell Oil Co., Inc., declared that the form of an agreement is a matter of growth, like Lease Form 88, and is not created. You will not be able to get anybody to sign it. "If you can find any six in this crowd who will agree to sign it, I will eat your hat. If New Mexico proposed to take over control of federal oil land in that state you would say 'No.' If the Government proposed to take over the state land, the answer would be 'No.' If you proposed to take over the private land and run the oil industry, the answer would be 'No'."

Phillip R. Calkins, land man for the California Co., submitted a personal statement, there being insufficient time to obtain approval. He said conservation was essential, but unitization is not and he did not believe the owners and operators will sign under the proposed plan.

C. S. Hill, Denver, independent, expressed the belief the Washington men came west to bring about changes in policy that would give the secretary more power. Certain individuals in his department do not agree with him. He suggested that the oil men be requested to submit a proposal upon which an agreement can be reached now. Chairman Chapman interrupted to say the oil men had been invited and did submit suggestions. Hill concluded with quoting the Saturday Evening Post which said the Government wanted more wells but couldn't get them drilled.

Mr. Cunningham said they were beating around the bush. No matter who wrote the proposals, the question is "Who is going to have control of the properties?"

Senator O'Mahoney of Wyoming said it was not a senate hearing, but that he wanted to make a suggestion. The proposed regulations, he said, were drafted in the survey and they alone can tell what is in their minds. Out of this grew a decision that the afternoon session should hear the survey's side.

States Guard Rights

Judge J. O. Seth, Santa Fe, N. M., representing Stanolind Oil & Gas Co., said he concurred in the position of the New Mexico Oil and Gas Association. No unit could be formed in that state without involving state land, and as Commissioner Kelly had said, he could not deliver his authority to the federal Government. The only way that could be settled is for dual control. He declared that an attempt the night before by the oil men to frame an agreement had resulted in a "mess."

At the meeting of about 40 oil men preceding the hearing, a series of seven questions to be submitted was agreed upon as follows:

1. Why is it necessary that the U. S. Geological Survey shall have such extensive powers over exploratory drilling, development, and operating practices as are embodied in the proposed regulations?

2. Are the broad powers proposed to be lodged in the secretary of the interior and the officials of the U. S. Geological Survey necessary in order to insure proper conservation practices?

3. Why should not the Department of the Interior approve any unit agreement approved by all other parties in interest so long as the agreement does not adversely affect the proprietary interest of the United States and is consistent with proper conservation practices?

4. Why is it necessary to have any additional regulations bearing on this subject?

5. What is the legal authority for these regulations which have been proposed?

6. What is the practical necessity for the type of regulations proposed?

7. In view of the pressing urge for exploration and development of new reserves, is it thought that these, or any, regulations will encourage development on the public domain and promote the war effort?

Mr. Soyster opened his statement for the U.S.G.S. by saying all matters of policy had to be referred to Washington and legal matters to counsel and he would not attempt to interpret for them. In response to Senator O'Mahoney's question as to what the survey had on its mind, he replied that it did not propose any change in policy or procedure and had not done so since 1930. What they were trying to do was to put these things on paper. The survey has never in any sense considered the proposed form of agreement as anything but a model which might be satisfactory for one set of conditions and not for another. Instead of regulations, it was more a method of procedure. The regulations regarding the submission of unit and cooperative plans are subject to amendments and modifications and are not final. There had never been any requirement for a single operator for a field and there may be a committee or others, he said. There is no prohibition. To date, he added, we have not opposed any operator chosen. As to control and supervision, the survey is obliged by law to assume a position of supervision, but in a broad sense only supervision to conserve and protect the interests of all concerned.

Clarel Mapes, secretary of the Mid-Continent Oil and Gas Association, interrupted to ask if the proposals merely were to put in writing the practices and procedure built up during the years, why would not a text, guide or monograph be published without making the regulations.

Mr. Cunningham asked whether the department will insist in maintaining

C. E. Hinkle, Robert M. Allen, Jr., John M. Kelly, George E. Brimmer and Dean Terrill pause outside the hearing room after registering opposition to the proposed unitization plan

control as to when and where wells will be drilled.

The law, Mr. Soyster replied, makes these provisions with some exceptions which permits the secretary to act according to his judgment. In response to a question by Senator O'Mahoney, he said no compulsion had been used in forming existing units except in some instances where the extension of leases were involved, and then not arbitrarily, but after ascertaining what would be fair and equitable in the protection of the interests of all. Operators should understand, he said, that as far as the survey is concerned it is not now nor will it recommend compulsory agreements. In regard to the attitude toward state and private land, the secretary already has stated we have no jurisdiction over them nor do we seek it. Senator O'Mahoney pointed out that some had read such a provision into the form. Whether the secretary has authority to delegate power over federal land to a state is a matter of law, and if lawful, becomes a matter of policy.

The question of expediting decisions on matters brought before the survey at Washington brought out a number of examples of delay. L. L. Aitken, Jr., Continental Oil Co., told of one incident where rig was up, crew on the ground waiting for 3 months for a certain decision from Washington.

Natural Gasoline, Condensate Output to Rise Sharply

WASHINGTON, D. C.—A record production rate of 4,694,200 bbl. per day of all petroleum liquids has been certified by the Petroleum Administration for War to the various oil-producing states for December. This figure represents a net increase of 58,500 bbl. per day over certified production during November.

Natural gasoline and allied products next month are expected to contribute 269,100 bbl. daily to the total liquid output, a rise of 16,700 bbl. over the estimated yield in November.

With the exception of the eastern states (PAW District 1), where a slight decrease in the rate certified was made to conform with the productive capacity of oil fields in that area, December quota for each district showed a net increase.

"It appears that the decline in productive capacity for many of the larger unrestricted fields in Illinois and Oklahoma," explained Administrator Ickes, "have begun to level out noticeably. As a result, together with the development of important new reserves in Oklahoma, our certified production rates for the Midwest (District 2) have been increased to conform as nearly as possible with anticipated actual production.

"The net increase in District 3 is attributable entirely to Texas, where measures promulgated by the Texas Railroad Commission in the interest of preventing physical waste in the East Texas field have made it possible to increase oil withdrawals as a result of a sharp decrease in net water production.

"Additional productive capacity in District 4 and District 5 has been made available as a result of new drilling and adjustments of production rates for several important fields.

"For those states that have no state regulation of production, we are certifying rates that past performance indicates will actually be produced. However, in view of the necessity for obtaining all the oil that can be efficiently produced, I am urging that those states that have no state regulation produce all the oil possible compatible with efficient production practices."

Supply of Carbon Steel Improved for Next Quarter

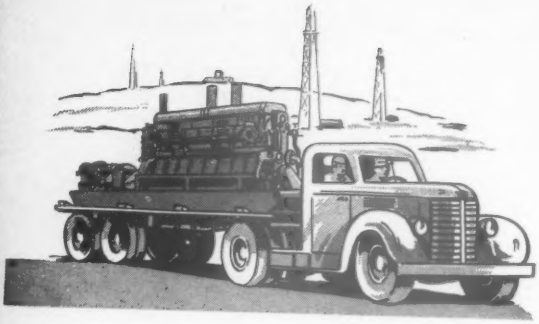
WASHINGTON, D. C.—The requirements committee has completed its task of allotting available critical materials to military and civilian agencies for their operations during the first quarter of 1944, Donald M. Nelson, chairman of the War Production Board said last week.

Carbon steel remains the controlling factor in war and home front production, according to J. A. Krug, chairman of the requirements committee. Sufficient quantities of alloy steel, aluminum and copper to insure completion on time of all essential programs will be on hand, Krug said.

Although carbon steel production is still substantially below demand, WPB officials believe that supplies of the basic metal to be available during the first 3 months of the coming year will be larger than in any comparable period in the past. Hard-boiled figuring places the amount at 14,470,000 tons in controlled material.

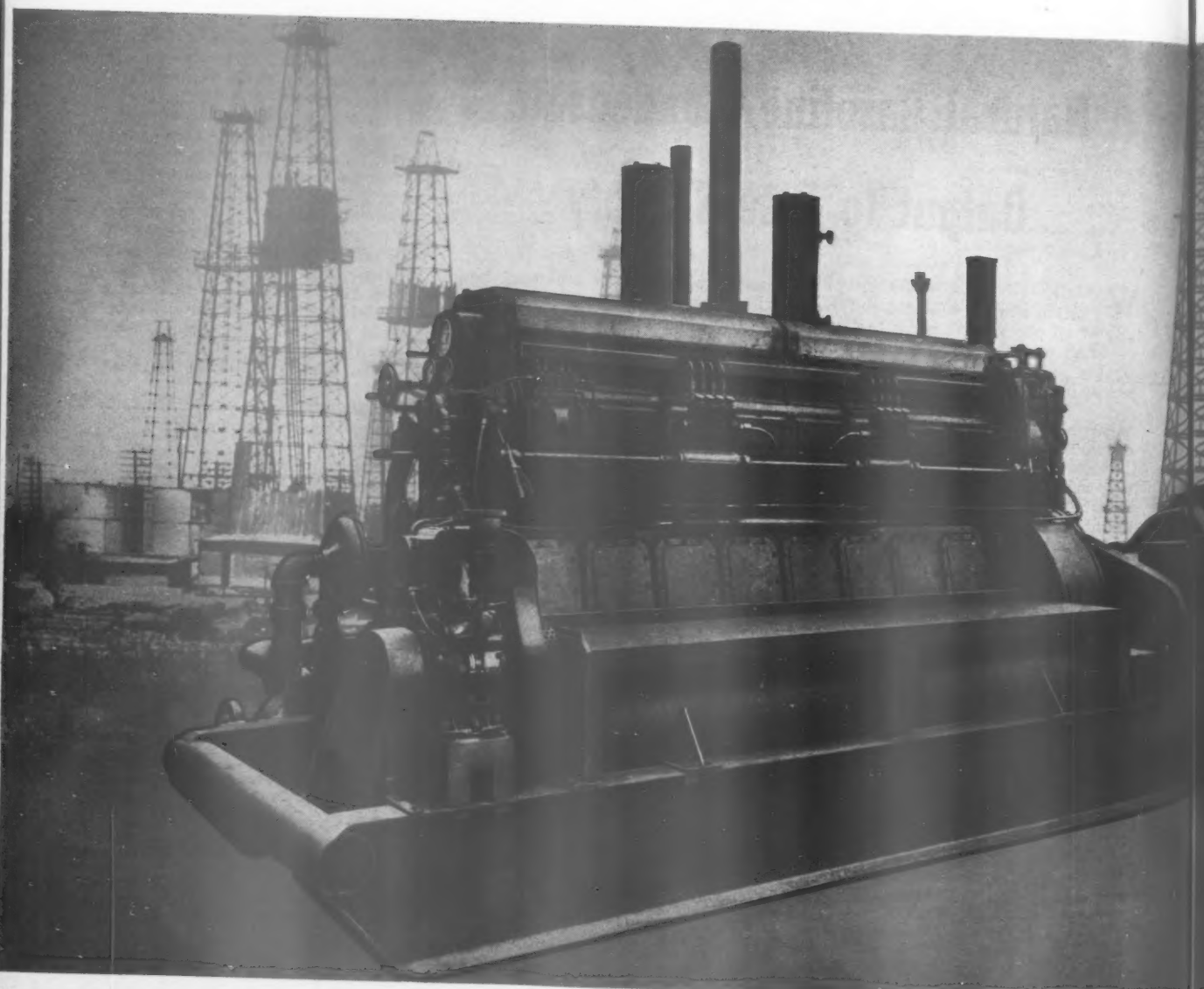
CERTIFIED PRODUCTION RATES IN BARRELS PER CALENDAR DAY

	December 1943		Nov. 1943,	Dec. 1942,
	Certified total petroleum liquids	Estimated natural gasoline and condensate	Certified total petroleum liquids	Actual production total petroleum liquids
District 1:				
New York	14,400	.....	14,500	14,600
Pennsylvania	45,500	1,500	46,300	46,100
West Virginia	16,400	7,000	15,900	16,900
Total	76,300	8,500	76,700	77,600
District 2:				
Illinois	227,700	12,700	217,600	260,500
Indiana	14,400	.....	14,000	15,800
Kansas	291,100	6,100	291,000	293,200
Kentucky	28,500	3,000	27,500	19,000
Michigan	57,100	100	56,100	60,300
Nebraska	1,500	.....	1,600	2,500
Ohio	9,600	400	10,100	9,100
Oklahoma	358,000	28,000	346,000	388,400
Total	987,900	50,300	963,900	1,048,800
District 3:				
Arkansas	81,700	4,800	81,700	76,800
Louisiana	375,700	22,000	375,700	324,500
Mississippi	48,000	.....	49,000	60,100
New Mexico	116,600	6,000	116,600	97,600
Texas	2,018,000	126,000	1,999,000	1,508,900
Total	2,640,000	158,800	2,622,000	2,067,900
District 4:				
Colorado	7,000	.....	7,000	6,200
Montana	23,800	300	23,300	22,300
Wyoming	103,700	3,700	100,800	92,100
Total	134,500	4,000	131,100	120,600
District 5:				
California	855,500	47,500	842,000	817,700
Total United States	4,694,200	269,100	4,635,700	4,132,700



EASILY

FROM STATIONARY GAS

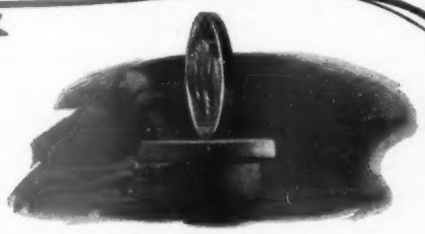


DIESEL AND GAS ENGINES

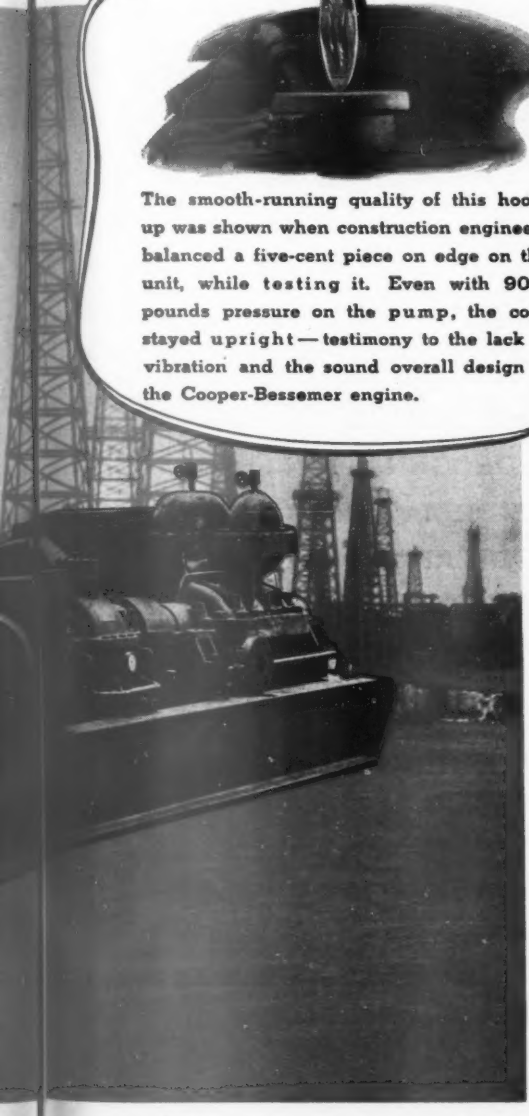
AND COMPRESSORS

CONVERTED

ENGINE TO PORTABLE DIESEL



The smooth-running quality of this hook-up was shown when construction engineers balanced a five-cent piece on edge on the unit, while testing it. Even with 900-pounds pressure on the pump, the coin stayed upright—testimony to the lack of vibration and the sound overall design of the Cooper-Bessemer engine.



TO meet a critical demand for more pumping capacity a major pipe line company at Tulsa, Oklahoma, converted this Cooper-Bessemer eight cylinder, Type EN, gas engine to diesel operation and rigged it up as shown.

The engine originally was one of six stationary gas engines. Now, mounted on a skid, and direct connected to crude oil pump it is being used to boost the capacity of a pumping station from 30,000 to 40,000 bbl. per day.

It can also be used for pumping on small temporary feeder lines from new wells, or as a stand-by on a trunk line. A generator fitted at the flywheel furnishes power for lighting.

The Cooper-Bessemer to install now for oil field power is the G-MV. In its rugged, compact construction, are coupled high efficiency and economy with easily convertible design for added usefulness and extra savings.

by **Cooper - Bessemer**

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Refiners who put off their post-war planning too long are likely to be left at the post—or at least, not to be in at the finish

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ALKYLATION
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Petroleum Process Pioneers
For All Refiners

The Refiners Institute of Petroleum Technology

War Department Defends Canol Project

(Continued from page 20)

which will yield about 500 bbl. daily of aviation fuel. None of the projects is completed and cannot be for many months and only then by expenditure of some $30,000,000 additional.

Six months after the war Norman Wells reverts to Canada and Imperial without cost. The pipe line and refinery are to be sold at the then commercial value but only under conditions to be imposed by a joint United States-Canadian defense board.

At PAW insistence a products pipe line was built from Skagway to White Horse to move gasoline brought in by tanker from California and barges from Prince Rupert. This line has been completed to Carcross, south of White Horse on the Alaska Highway and from there branches are under construction along the highway route south to Watson Lake and north to Fairbanks.

The Army started the Canol project in February 1942 with a request to the Budget Bureau for $25,000,000 for a strategic project at Fort Norman and White Horse, not further identified. At that time the War Department was not required to make detailed estimates on emergency military expenditures so the Budget Bureau did not investigate. A year later the bureau had reason to suspect Canol would cost several times the original estimate but the Army would not furnish information so it made its own investigation. In June 1943 the bureau recommended that the project be dropped and that the Alaska theater be supplied with petroleum by water. The Army insisted that the project continue but promised to consider the possibility of some modification of original plans.

Ickes told the committee that the War Department consistently refused to give him any information on Canol or consult with PAW, but since the Truman investigation began the Army has proposed that PAW make a joint study with it of future construction there. Ickes told the committee he would recommend against spending any more funds because the contract benefits only Canada and Imperial Oil and "it is not sound business judgment to spend $30,000,000 more to buy nothing."

Ickes heard about the project from the contractor by accident in the late spring of 1942, he said, and immediately asked the War Department for a report, citing the President's order directing other federal agencies to consult with him on oil projects. The Army did not give information but from what Ickes had learned he criticized the project on many grounds. This controversy continued all summer but the Army finally agreed to let PAW send a technical expert to the area but before this man reported the Army informed Ickes it was going ahead. However, the Army did adopt Ickes' suggestion for a 4-in. pipe line from Skagway to White Horse. Ickes told the committee this line has filled all oil needs for that area and that one tanker operating 3 months a year from California could supply as much oil as the entire Canol project was designed to produce. He said the Army was afraid the Navy could not protect water shipments of oil to Alaska but that much of the equipment for Canol and other projects went by water and all oil needed above Canol capacity would have to move this way.

For 2 years, Ickes said, he has tried to get the Army to develop oil in Alaska but only in the past few weeks has the Army agreed to drill one test well there next spring. He condemned the Canol contract for specifically excluding exploration in Alaska and confining all development work to Canada.

Under questioning, Ickes said both the Army and Navy repeatedly refused to tell him of their future oil requirements on grounds of military secrecy, though the British Government gave him full estimates, and all he got about United States military oil needs came to him from London. He said this situation is a little better now but he still does not know what oil requirements will be.

High Costs Questioned

Senator Ferguson, who visited Canol, asked Budget Director Smith if he had investigated reports that contractors were paying truck drivers $1,000 per month under a cost-plus contract, or why it shipped California redwood to construct a $259,000 temporary office building at Edmonton when the work was being done at White Horse, 1,000 miles away. Smith said he had not investigated any items of cost but only whether the Army had exceeded its budget authorization on this project, and concluded that it had by 260 per cent. He also said the original Army justification was to supply aviation gasoline for that area but the project is engineered to produce less than 500 bbl. per day.

The most damaging criticism of the Army was supplied by H. Leroy Whitney, technical consultant to WPB Chairman Donald Nelson, who produced records to show that the Army had flatly refused to permit WPB to check on the amount of critical materials going to Canol or other Canadian Northwest projects.

He explained that prior to October 1942 WPB permitted the Army and Navy to write their own priorities on strategic projects. Then Nelson ordered a halt to all nonmilitary construction and a review by the WPB facilities board of all military projects with a view to their curtailment. The Navy complied but Army refused. Minutes of WPB meetings showed that Fred Serles, chairman of facilities board, tried repeatedly during December and January to get the Army to let WPB look into Canol. The Army refused and said it would not curtail Canol regardless of what WPB concluded.

Late in January, Serles washed his hands of Canol in a memo to Nelson, saying WPB should be on record as having done all possible to stop this "huge and useless" project. He said Canol is not a strategic project; was no longer secret; involved factors outside of military jurisdiction which required review by government civilian agencies; even if successful, the project would cost so much as to be of doubtful value; there is no justification for curtailing important war projects in this country to divert supplies to Canol; the project was certain to receive unfavorable publicity and be investigated by Congress, and WPB would be criticized for not being able to stop it.

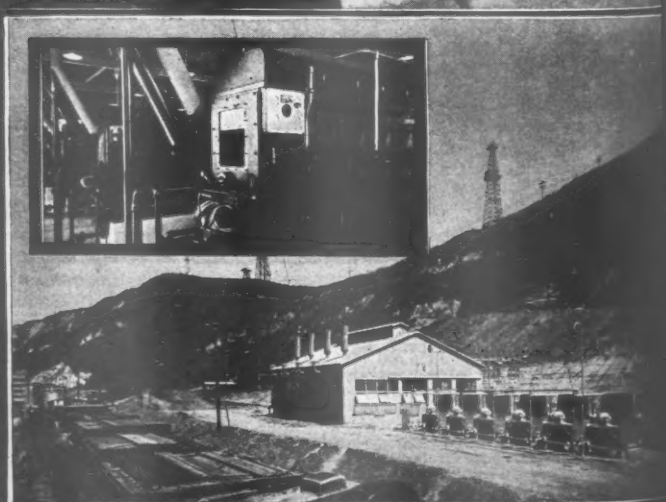
Thereupon Nelson directed Whitney to make an independent investigation of Canol in an attempt to get enough data to force the Army to reconsider. In this report to Nelson late in March 1943 Whitney disclosed that the Army had not consulted the U.S.-Canadian Meteorological Board, other available information, aviators and explorers familiar with the region, or any competent authority. As a result its locations for roads and airports are inferior to others equally available. He submitted technical data demonstrating that Canol is the "height of folly," and said in his considered opinion the Army had used bad judgment and wasted vast amounts of transportation, materials and manpower. He urged that Canol be dropped immediately.

Among other things Whitney's report showed the Norman Wells crude has a pour point of 40° below zero and the paraffin precipitates at 20 below and sticks to pipe-line walls, but average winter temperature at Fort Norman is 53 below and over the Mackenzie Mountains on the pipeline route it is 70 below. He also showed that the Army had not considered such things as roads or airports to supply crews at pumping stations, water supply for steam at the White Horse refinery, or special problems of operating a refinery under arctic-winter conditions.

Whitney recommended to the Truman committee that the War Department be deprived of all control over any matters pertaining to petroleum because it has handled these "in the most unsound way," and that full control over oil supplies for the military be given to civilian agencies under direction of PAW.

What are

An efficient 13¼ x 16 Type CTE Superior Gas Engine installation in an Illinois oil field operation.



Four 8-cylinder, 12½ x 16½, converted Superior Diesel Engines operating on natural gas, in a large California oil field operation.

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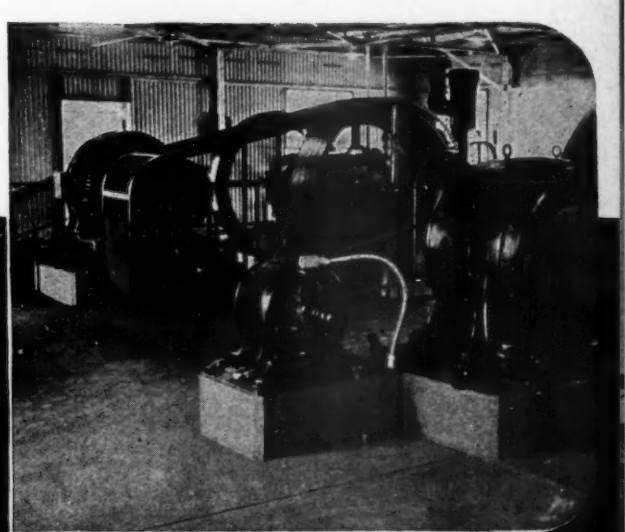


Another money-saving installation of two Superior Engines in a well-known Illinois oil field operation.

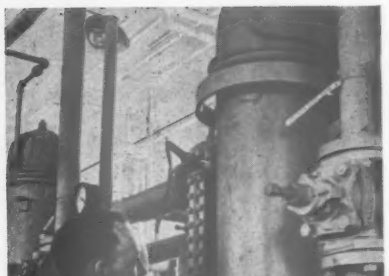


Photo courtesy U. S. Rubber Co.

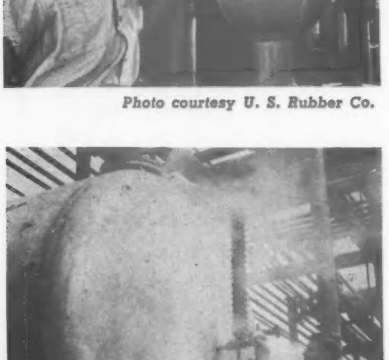
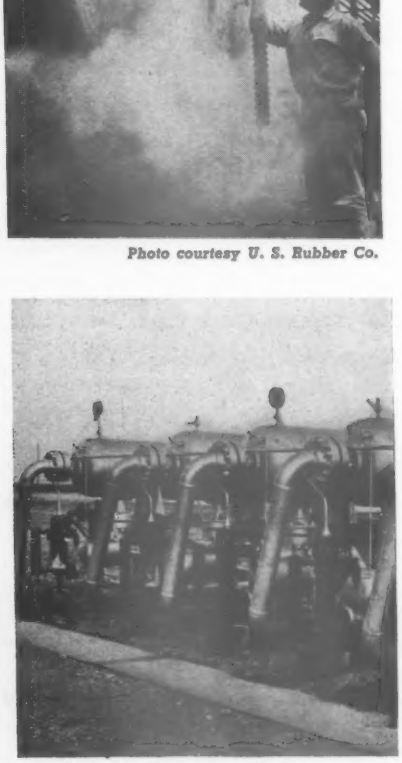


Photo courtesy U. S. Rubber Co.



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On what . . . on about twenty different pieces of processing equipment including tanks, stock line tanks, decanters, pump cushion chambers, and receivers.

With what . . . with Jerguson Reflex and Transparent Gages.

WHEN every link in a chain is strong, the chain itself is strong. The same is true of equipment installed for carrying out a process . . . synthetic rubber, for example.

In a synthetic rubber plant there are numerous places where it is important that *readable and durable* liquid level gages be used. They are links in that chain stretching from raw materials to finished products. They must be good.

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11-JV-1

Success Assured on Disney Bill Petition

WASHINGTON, D. C.—The congressional move to force a higher ceiling price for crude oil has gained headway this week.

Advocates of crude price increase asserted November 23 that they had enough signatures to carry the petition to discharge the Disney bill from committee and predicted several more House members would sign during the week.

The bill (H.R. 2887) introduced by Rep. Wesley Disney, Tulsa, would require the Office of Price Administration to fix ceilings on crude oil at "parity" with the wholesale commodity index. This would require an increase of something over 50 cents per barrel. If the petition is signed by a majority of the members (218 is a majority of the full membership) the petition may be called up for a vote on the floor on the second or fourth Monday of any calendar month, and if the motion to discharge the committee is carried, the bill itself may be made the next order of business.

Signing of the discharge petition was speeded by circulation of a resolution adopted by the Petroleum Industry War Council at its Chicago meeting calling upon Congress to take action to insure an adequate price for crude oil.

Sohio Producing Co. Buys Adams Oil & Gas Co.

HOUSTON, Tex.—Sohio Producing Co., subsidiary of Standard Oil Co. of Ohio, this week was reported to have purchased remaining assets of the Adams Oil & Gas Co. of Houston, including producing and undeveloped properties in the Southwest Texas area, principally along the Wilcox trend, centering in De Witt County.

Sohio is also reported to have taken Adams' interests in Illinois production, along with extensive royalty holdings in several states. Consideration was reported as including a cash payment and assignment of 54,847 shares of Standard Oil Co. of Ohio stock at $41 per share.

Synthetic Rubber Proves Postwar Industrial Value

AKRON, Ohio.—Any rumor or statement charging that the need for synthetic rubber will stop with the termination of the present war emergency ignores the most important factor of the entire rubber industry's future.

This factor, according to a statement released here last week by the Hycar Chemical Co., is the superiority of synthetic rubber over the natural product established in innumerable industrial applications before the war. Lack of knowledge of the actual facts, the statement says, is the cause for many ill-advised opinions, some of them by persons in positions of considerable public prominence.

Comparing synthetic and natural rubber on merit alone removes all doubt as to the future of the synthetic, according to the company.

P. E. P. A. Program Features Eight Papers, Open Forum

DALLAS, Tex.—The annual meeting of the Petroleum Electric Power Association will be held here December 1 and 2. Following is the program of the meeting, which will be held at the Baker Hotel.

Wednesday, December 1

The Big-Inch Line, by W. H. Stueve, Oklahoma Gas & Electric Co.

Petroleum Byproducts, Present and Future, by E. L. Robinson, Gulf States Utilities, and R. S. Mauney, Southwestern Public Service Co.

Pooling of Utility Resources, by F. M. Austin, Houston Lighting & Power Co.

Deep-Well Drilling With Purchased Electric Service, by P. M. Cordell, Texas Electric Service Co.

Thursday, December 2

Postwar Competition From Private Plants, Steam and Internal-Combustion Engines, by E. A. Armstrong, Public Service Co. of North Illinois, and W. V. Woodward, North Indiana Public Service Co.

The Ounce of Prevention vs. the Pound of Cure, by K. K. Kreamer, Houston Lighting & Power Co.

Educational Program for Power Engineers, by O. W. Jones, Central Power & Light Co.

Advertising Program, by Ray K. Glenn, Advertising.

Open forum discussion of present and postwar competition, training for power engineers, government contracts, and other subjects which the members desire to discuss. The entire afternoon will be devoted to this open forum discussion.

DEATHS

Ward C. Pearl, 51, president of American Mineral Spirits Co., Chicago, died last week at his home in Kenilworth, Ill. Mr. Pearl, who had been in the oil business since 1917, was one of the organizers of American Mineral Spirits in 1923 and had been its president 15 years.

Frank O. O'Flaherty, 67, erecting engineer for National Transit Pump & Machine Co., Oil City, Pa., for the past 30 years, died at his home in that city.

Arlington Coryell Harvey, 70, of Evanston, Ill., who retired as chief counsel for Pure Oil Co. in 1937, but continued with the company in an advisory capacity, died November 16 at his farm near North Prairie, Wis. Mr. Harvey was one of the incorporators of Columbus Production Co., which became Ohio Cities Gas Co., predecessor of Pure Oil Co.

Ennis Edward Boles, production superintendent for Quintana Petroleum Co. and a resident of Thompsons, Tex., for the past 13 years, died last week.

Henry L. Williams, 73, pioneer in several western oil fields, died last week in Phoenix, Ariz., at the home of a business partner, James W. England, Jr.

Frank Ellis VanWormer, oil producer and dealer in oil-field supplies in North Texas since 1918, died November 16 in Wichita Falls, Tex. A native of Warren County, Pennsylvania, he had, with his father, the late J. H. VanWormer, owned production in Pennsylvania, West Virginia and Ohio before moving westward, finally settling in Wichita Falls.

John W. Carnes, 60, vice president and general sales manager, Sinclair Refining Co., died November 20, at a New York City hospital, after an illness of more than a month. Following several years of railroading he joined Texas Corp., Chicago, as assistant manager of railway sales, and in 1917 joined the Roxana Petroleum Co. as traffic and sales manager. He joined the Sinclair organization in 1919 as manager of refinery sales, with headquarters in Chicago, becoming general sales manager in 1921. In 1922 he was elected vice president in charge of sales, Sinclair Refining Co. In 1924 he went to New York to establish general sales headquarters. He was a director and member of the executive committee of Sinclair Oil Corp.; director and vice president in charge of marketing operations, Sinclair Refining Co., and an officer of numerous other Sinclair subsidiaries and affiliates. He served as chairman of the PAW marketing committee of District 1 and as a member of the Petroleum Industry War Council.

Thomas Robert Batte, 60, retired pipe-line superintendent for Continental Oil Co., died last week in Houston, Tex. In 1909 he became a civil engineer for Rio Bravo Oil Co. Three years later he was sent to Tampico, Mexico, with the East Coast Oil Co., for which he was first civil engineer and then general manager until 1920. In that year he was made general manager of Atlantic Gulf & West Indies Co., continuing to reside in Tampico. He went to Houston in 1933 as superintendent of the Texas and Louisiana division of Continental, later becoming pipe-line superintendent of the division.

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  13,000 lbs.—Tons lighter than any competitive unit.
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Baltimore Refinery Rebuilt to Produce 100-Octane Gasoline

by J. P. O'Donnell

Standard of Jersey's refinery at Baltimore, Md., has been transformed, at a cost of $14,000,000 into a self-contained plant for manufacturing 100-octane gasoline. Principal features include a fluid-catalyst cracking unit an alkylation unit, atmospheric pipe still and a light-ends plant.

TRANSFORMATION of a refinery outmoded by the wartime development of entirely new processes into a selfcontained plant capable of producing a substantial volume of 100-octane gasoline will be completed this month at the Baltimore, Md., refinery of the Standard Oil Co. of New Jersey. This plant was built originally in 1877 and modernized most recently in the late '20s and early '30s. The program, now in the last stages of completion, represents an expenditure of $14,000,000.

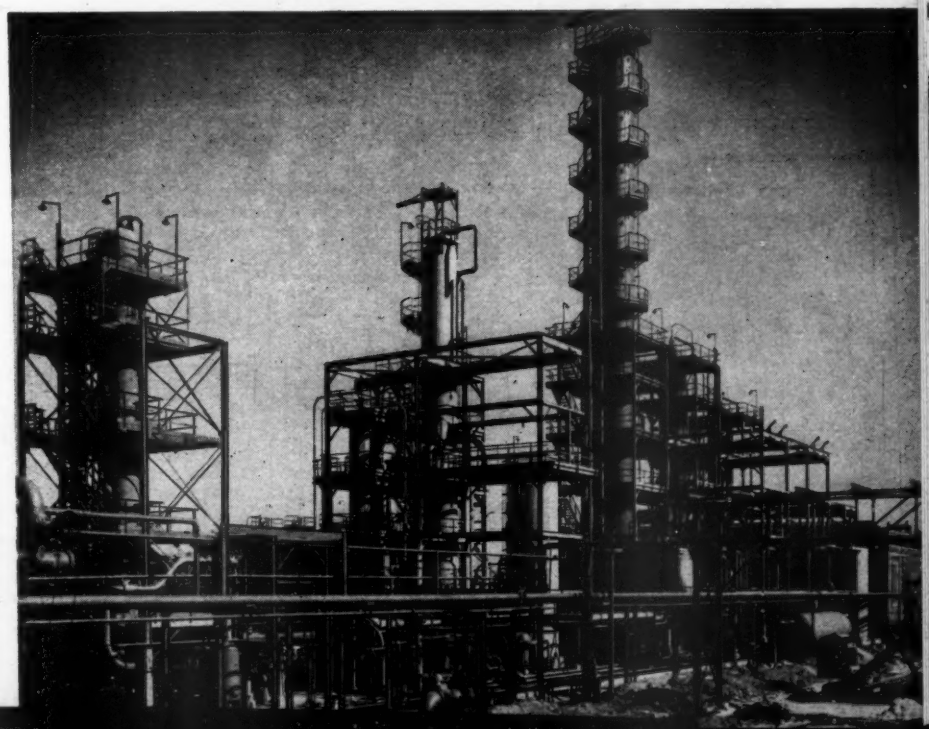
The principal unit of the new facilities at Baltimore is a fluid-catalytic cracking unit. Others, all of which will participate in or contribute to the production of 100-octane gasoline include an alkylation unit, atmospheric pipe still, light-ends plant, gas-compression plant and laboratory with their auxiliary equipment such as piping, tankage, etc. All of the new units are modern in design and most of them include departures from standard practices either in design or operation which represent new developments in the industry.

Previous to the modernization program, distillation equipment at the Baltimore refinery consisted of two vacuum stills, which had been installed principally for improved lubricating oil and asphalt yields, and a large number of shell stills. Five years ago the refinery had the 2 pipe stills and 47 shell stills. Today it has 3 pipe stills and 10 shell stills which require an area of 5.3 acres in contrast to the 12 acres which was devoted to distillation equipment in 1938. The fact that today's units have a charging capacity more than 40 per cent greater than the old equipment but require only 45 per cent as much area illustrates the progress that has been made in the art of refining.

First of the new units to be completed was the alkylation plant which went on stream November 14, 1942. Charge stock consisted of light ends from existing thermal-cracking facilities at Baltimore and material brought in from other refineries. Because of limited transporation facilities available during the past year and limited storage capacity this was a complex operation. It involved maintaining a balanced feed of isobutane and butylenes which were obtained from several sources in varying quantities at irregular intervals. In normal operation the refinery will produce sufficient feed stock for this unit in the future but under certain circumstances it will probably be necessary to import some portions of it. Most will be be available from catalytic-cracking operations but some olefins will be available from the thermal-cracking coils.

Second unit to go into operation was the light-ends plant, including the gas-compression unit, which start-

Scrubber unit and alkylation unit fractionation towers



ed up May 24, 1943. Since then it has been processing overhead gas and distillates from the thermal units and the depropanized charge to the alkylation unit. The gas-scrubbing plant went into operation about the same time. It treats fuel gas for the engines of the gas and distillate compressors in the compression plant and the propane refrigeration unit in the alkylation plant.

Latest of the major units to be completed was the pipe still, which was finished in June and ran the first crude on the eigtheenth of that month. Prior to the completion of the catalytic cracker, the pipe still processed crude to supply gas oil for the thermal-cracking plant, naphtha for the thermal reformer and a residuum which was charged to a low-pressure visbreaker. When the catalytic-cracking unit goes into operation, the pipe still will be operated to produce the maximum charge for it. Supplementary charge will be available from one of the vacuum pipe stills operating in conjunction with a continuous four-shell still. The other vacuum still will be available for asphalt production but may be used to relieve utility requirements by being used as a steam boiler. The old thermal-cracking coils will be used to reform a heavy cut from the cat cracker.

The catalytic-cracking plant, scheduled to go into operation in late November, will be the dominating unit of the refinery, not only from the standpoint of physical size but also from the standpoint of operations. All other units will be geared to produce feed stock for it or to process products from it. The Baltimore catalytic-cracking unit is simpler in design than the original fluid units and embodies a number of improvements. It is 235 ft. high. The great height is required by the fact that the regenerator must be 100 ft. above ground to provide a static head sufficient to keep the catalyst flowing into the reactor. Large-diameter lines are needed to handle the catalyst flow.

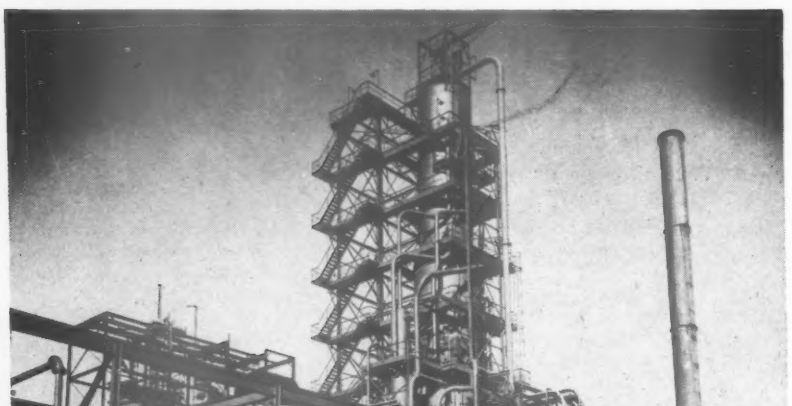
Other construction included expansion of the boiler-plant capacity, the installation of a new 36-in. water line, erection of a new laboratory which is equipped with all necessary analytical equipment, and the enlarging of the instrument department. The expanded boiler plant delivers steam at 600 lb. per sq. in. to two generators producing electric power. They exhaust it at 125 lb. per sq. in. and this steam is admitted to the yard main to provide power for all prime movers. They exhaust, in turn, at 15 lb. per sq. in. and this steam is used for heating and open processing.

No Interruption

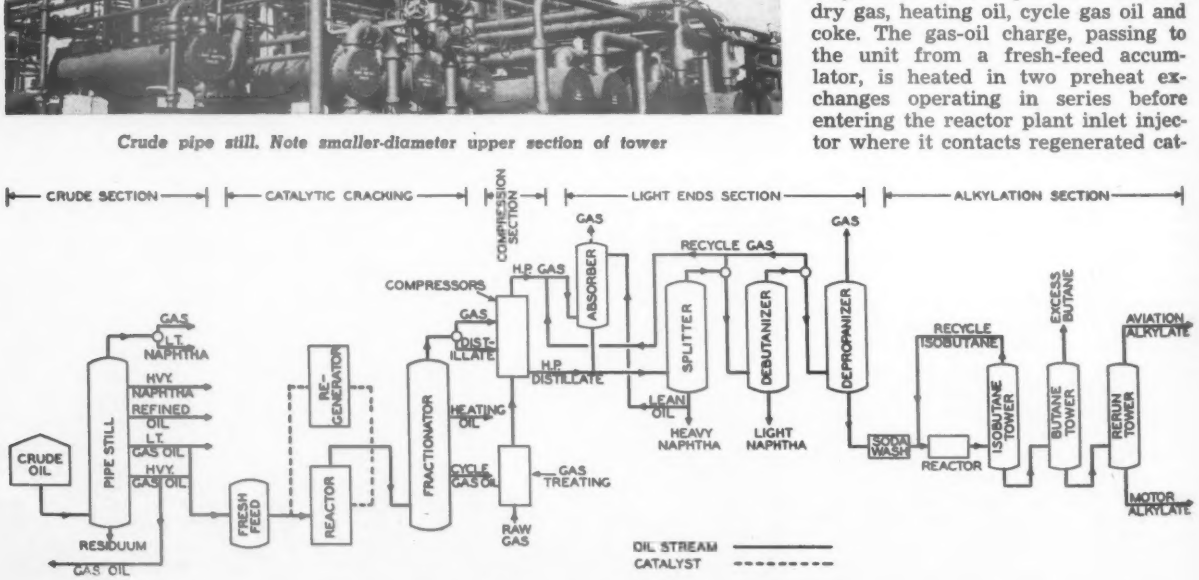
The refinery continued uninterrupted operation throughout the period of construction which covered almost 2 years. Continuous operation was complicated not only by the construction which was under way but also by the fact that during this time it was necessary to convert crude-receiving facilities from handling tankers to handling tank cars. Tank-car unloading shifts were kept in operation 24 hours a day to handle the several hundred cars of crude oil that were consigned daily to the refinery.

Another problem was training personnel to handle the new equipment. In line with a company policy, this personnel is composed entirely of old employes, many of whom have been at Baltimore 20 to 30 years. These employes were given a training course to prepare them to operate the new units.

The fluid-catalytic cracker will charge a wide-cut virgin gas oil and will produce principally aviation-gasoline base stock and material for alkylation. Other products include dry gas, heating oil, cycle gas oil and coke. The gas-oil charge, passing to the unit from a fresh-feed accumulator, is heated in two preheat exchanges operating in series before entering the reactor plant inlet injector where it contacts regenerated cat-



Crude pipe still. Note smaller-diameter upper section of tower



Schematic diagram of 100-octane facilities at Baltimore refinery

Left: Looking east from catalytic-cracking unit showing light ends, alkylation, gas-compression, and gas-scrubber units. Right: Catalytic-cracking units looking northeast, showing overhead lines to left of picture

alyst and the oil-catalyst mixture enters the reactor.

Cracked vapors leave the reactor through a cyclone separator where part of the entrained catalyst is removed and thence to a fractionator. Spent catalyst removed at this point is steam-stripped before being returned to the regenerator. Regeneration is carried on at a temperature of 1,000°-1,200° F.

The fractionator separates the cracked vapors into five streams: Gas and an overhead distillate which are then passed to the gas compression plant, stripped heating oil which is filtered and run to product storage, a heavy cycle gas oil suitable for use as blending stock and a small amount of bottoms. Since the reaction is effected at high temperatures there is excess heat for fractionation. This excess is removed in a pump-around circuit by which splitter-tower feed at the light-ends plant and the feed to the catalytic cracker are preheated and steam is generated in a waste heat exchanger.

Air and flue gases from the regenerator still contain a small amount of fines and therefore go to a Cottrell precipitator after passing through a waste heat boiler. The flue gas is then vented to the atmosphere and the fines returned to the regenerator. Steam used by turbines driving the air compressors is condensed, recovered and used as feed water for the waste-heat boilers. Fresh catalyst is introduced into the system by injection into the spent catalyst after it leaves the reactor. Spent catalyst may be removed from the regenerator or precipitator standpipes.

There are several distinctive features in the pipe still which will operate for the maximum production of feed stock for the catalytic-cracking unit. Other products will include light and heavy naphtha, refined oil and pitch bottoms. Distinguishing features of this unit include the use of flash drums ahead of the furnace, a reflux circuit on the fractionating tower by which return is made above the point of withdrawal, a compact stripping column in which four products are processed simultaneously and the double-end-fired furnace with two radiant sections and a single, common convection section. This type of furnace promotes heat economy and results in lower construction costs.

Heating Crude Charges

The crude charge is heated in a series of side-stream and reflux exchangers before being split into two equal streams which are charged to flash drums. Water and light ends are vaporized and disengaged from the liquid in these drums by effecting a pressure reduction. Removal of the water at this point forestalls the possibility of its vaporizing gradually in subsequent exchangers and depositing any dissolved salts on the exchanger-tube walls. Indications are that the flashing step in these crude flash drums results in a fine salt which does not readily adhere to the walls.

After leaving the flash drums, the crude picks up additional heat from sidestream and bottoms exchangers before entering the furnace. Vapors from the flash drums join the crude steam a few tubes before the furnace outlet. An overhead stream of gas and light naphtha and four product side streams are taken off the 108-ft. fractionating tower. The product streams are charged to strippers where the light ends are removed by steam. Two other side streams are used to preheat the crude and are returned to the tower as reflux. Reduced crude bottoms are charged to the thermal-cracking plant. The strippers which normally handle kerosene, heating oil, diesel oil and gas oil, are contained in a single tower with the bottom of one serving as the top of the other. This reduces heat requirements and the number of vessels.

First of the two side streams in the novel pump-around system consists of heavy naphtha which provides reflux between the first and second product drawoffs and the second is furnace oil which is returned between the second and third product drawoffs. Returning these streams to points above those at which they were withdrawn contrasts with the customary practice of returning reflux at a lower point. This results in a saving in construction costs since the heat duty on the overhead pump-back system is decreased in an amount equal to the heat duty of the pump-around system and it permits a reduction in the diameter of the upper section of the tower. The upper section is 12 ft. 6 in. in diameter, the center section, 16 ft. 6 in., and the bottom or stripping section 5 ft. 6 in. The tower contains 34 fractionating plates and 4 stripping plates. Another advantage lies in the fact that frequently overhead vapors are too low in heat to provide satisfactory temperatures for preheating crude but, by using the so-called pump-around system, heat is available at higher temperatures. Both the rate and amount of heat transferred to the incoming crude are thereby improved.

The compressed overhead stream from the catalytic-cracking unit frac-

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The range of normal expansion of rubber used in Drill Pipe and Casing Protectors is from 100% to 200%.

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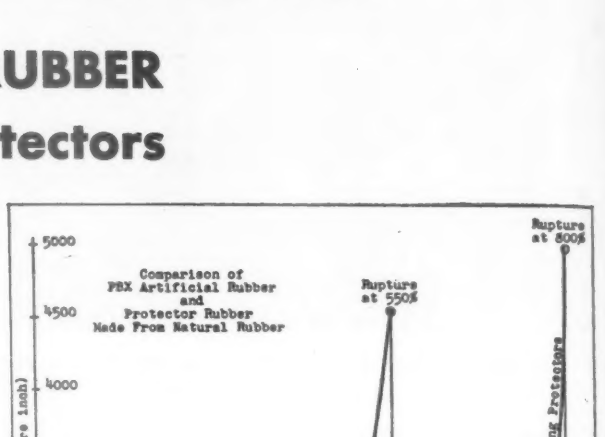

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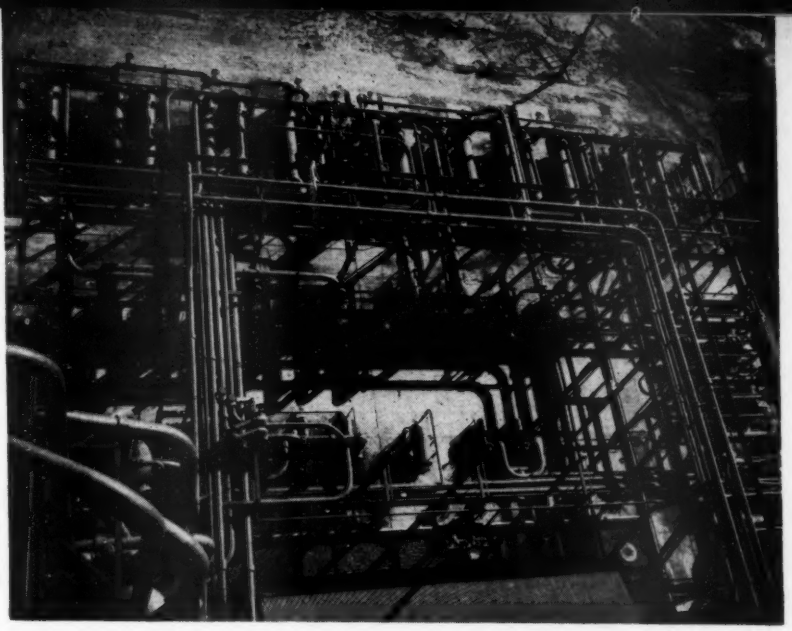
tionating tower, consisting of high-pressure gas and distillate, constitute the charge for the light-ends plant. This plant produces alkylation-plant feed, light and heavy naphthas, a light blending naphtha and fuel gas. Before joining the distillate the gas is processed in an absorber where it passes countercurrent to heavy naphtha which absorbs the heavier gas fractions. Unabsorbed gas passes overhead to a knockout drum where entrained liquid is recovered and dry gas is sent to the refinery's high-pressure fuel-gas system.

Fat oil from the absorber is mixed with the pressure distillate in an orifice mixer from which the mixture passes to a surge drum where water is drawn off and where additional gas is released to the high-pressure system. This mixture is preheated in exchange with splitter bottoms and bottoms from the cracking unit fractionator before going to the splitter where it is separated into an overhead stream of gas and light naphtha and bottoms of heavy naphtha. The bottoms are pumped through a reboiler furnace to provide heat for distillation. Some of the heavy naphtha is used as lean oil for the absorber and the remainder is run to product storage.

Overhead from the splitter passes to a reflux drum from which uncondensed gases are recycled to the absorber and a liquid product passes to the debutanizer. The debutanizer feed is split into two streams, one to be preheated by splitter bottoms and one by debutanizer bottoms, and reunited before entering the tower. Bottoms from this tower consist of light naphtha while the overhead stream consists of butane and lighter fractions. The overhead stream, after completing a cycle similar to the splitter overhead, goes to the depropanizer for further fractionation.

There are several innovations in the light-ends plant including intercoolers for the absorber menstrum, the use of cracked naphthas as the menstrum and a vapor side-stream drawoff on the debutanizer which permits withdrawal of excess isopentane. Two stages of intercooling are provided on the absorber since the absorption of light ends by the menstrum produces heat which it is desirable to remove. By drawing off the menstrum at two points, pumping it through intercoolers and returning it to the tower, heat removal is effected and a smaller diameter tower may be used.

Cracked naphtha is used as the absorber menstrum since it has a relatively low molecular weight, thus giving it high absorption capacity, and it has a low vapor pressure so that a negligible volume is lost by vaporization into the gas. The vapor side stream drawoff near the bottom of the debutanizer is used to relieve the concentration of isopentane which is the lightest component there and is present in the vapor state.



Looking down on exchanger preheating train, pipe still No. 3

Feed for the sulfuric acid alkylation plant consists of light hydrocarbons in the butane range from light-ends fractionation. The bulk of the feed will originate in the catalytic-cracking section though some is also available from crude distillation. This feed stock first passes through a depropanizer where the C_3 to C_4 fraction is removed, leaving C_4 fraction which is contacted in reactors with strong (98 per cent) sulfuric acid. Separation of the alkylation products from the unreacted butane is carried out in a fractionation section consisting of an isobutane tower, an excess butane tower which produces commercial butane and a rerun tower. The first two remove lighter hydrocarbons and the last separates the product into aviation alkylate and heavy alkylate for motor gasoline.

In the alkylation process, isobutane and butylenes are combined to form high antiknock, saturated octanes. By using strong sulfuric acid, low temperatures, which result in a minimum of secondary reactions between the hydrocarbons and acid, are possible. Heat removal is effected by a propane refrigeration unit. A large excess of isobutane is maintained in the reactors so that the butylenes will react with it instead of polymerizing themselves.

Hydrocarbon - acid emulsions are formed by the use of dispersion jets which exposes a large surface of the acid. Extended contact time is attained by circulating the emulsion. The product of the reaction is a part of the emulsion. Since the excess hydrocarbons act as a solvent, it is possible to recover the product by continuously withdrawing a part of the emulsion, separating the acid by settling and distilling the hydrocarbons to obtain the various fractions. The separated isobutane is recycled to maintain the excess necessary to saturate the acid in the reactor. The finished product is treated, blended with base stock and, with tetraethyl lead added, constitutes aviation gasoline.

The compression plant houses five 600-hp. gas-driven compressors. Here the low-pressure gases from the catalytically cracked distillates are compressed in two stages, the first discharging at 25 lb. per sq. in. and the second at 100 lb. per sq. in. Between stages the gas passes through intercoolers and the interstage knockout drum. Following the second stage it is contacted with compression naphtha from the interstage drum and low vapor pressure catalytically cracked distillate before passing through the aftercoolers. The high-pressure gas passes to the light-ends absorption tower while the enriched distillate combines with fat oil from the absorber to provide the feed for the light-ends splitter.

By contacting the high-pressure gas from the second stage with low-vapor-pressure catalytically cracked naphtha and the interstage compression naphtha, an absorption step is effected. This reduces load on absorption tower of the light-ends plant.

The gas-treating plant employes a Girbotol hydrogen sulfide scrubber and caustic washing system to produce a practically sulfur-free fuel for the compressor engines in compression plant and in alkylation plant.

It is apparent from this description of the various new units at the Standard Oil Co. of New Jersey refinery at Baltimore that it now is a completely modern plant from the catalytic cracker, most spectacular of the newer tools of refining, to the crude unit which embraces a number of new developments in the oldest of refining processes. Together they represent a development that normally would require at least a decade.

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Double Side-Door Choke For Dual Completions

by Harry F. Simons

Flow of each zone in a two-zone well through the tubing has been one concern of producing organizations. Another has been the separation of the formations after acidizing and while bringing in the well. Both of these problems have been solved by remodeling the side-door, bottom-hole choke so that it has a second set of ports and can be used to produce either formation selectively.

COMPLETIONS in more than one zone in a well are still comparatively new and consequently methods and equipment for such work are being continually introduced. One of the latest, which may go a long way in overcoming the objection of some of the oil industry to a dual or multizone completion is a new type choke with which it is possible to flow alternately and separately each of the two zones through the tubing. First of these chokes was put in service recently in a dual-zone well in a West Central Texas field and two more wells are about to be equipped with them.

The advantages and disadvantages, both economically and technically, of dual or multizone wells have been discussed by a number of parties. Most of the technical disadvantages involve the complexity of the equipment required and are really only mechanical problems to be overcome. Many of these have already been solved and the solution for others is indicated. However, there previously has been one objection which was rather valid, namely, the inefficiency and often the inability of flowing the upper zone of a dual-zone well through the annular space between the casing and tubing.

In the regular dual completion in the past, the lower zone was flowed through the tubing which was generally equipped with a bottom-hole side-door choke. As far as producing characteristics and the production efficiency were concerned, the lower zone was identical to an ordinary single-zone well equipped with tubing and packer.

The upper zone, on the other hand, was produced in a manner similar to a single-zone well before the introduction of tubing as standard flowing-well equipment, i.e., through the casing. This lead to high gas-oil ratios, inefficient flow, and eventually to cessation of flow. Obviously, part of the advantage of a dual completion is lost if the upper zone can be produced by flowing only a short time and artificial lift for that zone must be installed. Production of the upper zone through the tubing is therefore a necessity in some cases and a help in all wells.

The zone from which oil is produced through the tubing can be changed when using the double side-door choke by simply altering the position of the choke in the landing nipple. Regular single-strand wire measuring line and choke running and setting tools are employed when it is time to switch from one zone to the other.

The change in location of the choke needs only to be effected once a month as production from one zone can be obtained in the first 15 days of the month and from the other zone during the balance of the period. The choke is thus left in one position for a 30-day period. The method is identical with that used in other states where regulatory bodies demand the segregation of production from two-zone wells which are artificially lifted. In such cases the tubing perforations are located either above or below a packer, the change in position affecting the selection of the zone produced.

Making Completion

In making two-zone completion in a flowing well such as those in the West Central Texas field, the packer on the tubing is located in the casing between the pay horizons and immediately above the packer a choke-landing nipple is installed in the tubing string. In the particular field a control-head packer, which permits the space above and below the packer to be connected or disconnected by raising and lowering the tubing, is used. Before the introduction of the

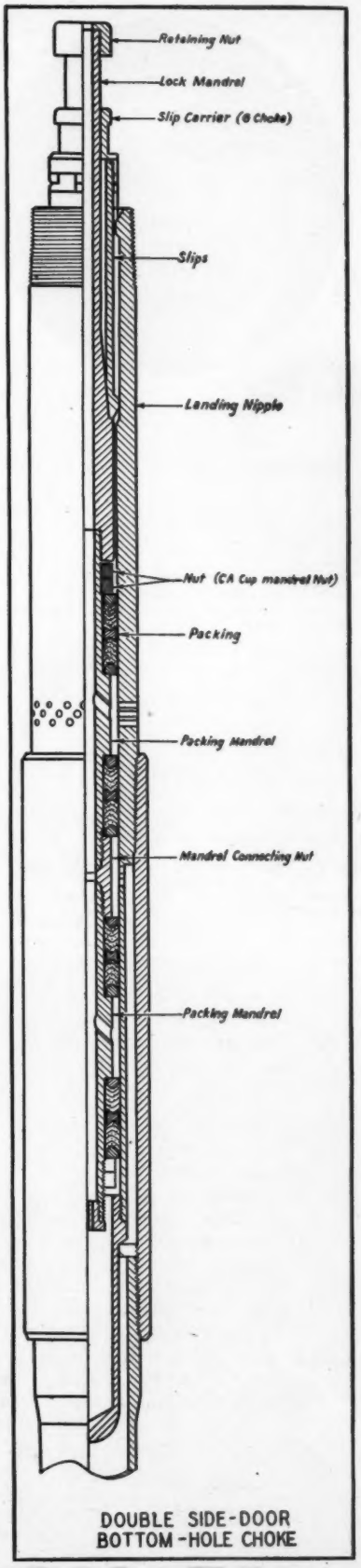

Fig. 1: Sketch of double side-door bottom-hole choke showing location of openings in choke landing nipple and ports in packing mandrel

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Equipment Maintenance Supt.

T. G. (GUY) HOLLAND
Superintendent of Ditching Machines and Heavy Equipment

CLIFTON DAVIDSON
Designing Engineer and Mechanical Technician

new type choke the two zones were produced simultaneously for a short period but this is no longer necessary as the new choke permits acidizing and testing of each formation separately.

The two-zone, bottom-hole, side-door choke has a more complicated landing nipple and an additional set of ports and packing rings in the choke mandrel. The choke landing nipple has an extension, the lower portion of which has the holes for admission of the production from the lower zone; the upper ports through which the top zone is produced are above the extension portion of the landing nipple.

Operation of Choke

When the double side-door choke is in its down position the production from the upper zone is free to enter through the top orifice but is prevented from mingling with the production from the lower zone by the packing; the lower ports in the landing nipple are blocked off so no fluid can enter from the lower zone. When the choke is raised, the upper port is shut by the packing and the lower port comes into the position where the production from the lower zone can enter the tubing string through the choke packing mandrel. The travel of the choke to effect this change in production is approximately 4 in.

To change the position of the choke it is only necessary to run in with the tools (consisting of the latching-on tool, stem and jars), latch onto the choke mandrel and jar down, or up, as desired. The tools are not left in the tubing although if it became necessary to change the position of the choke every day, this would probably be the procedure followed.

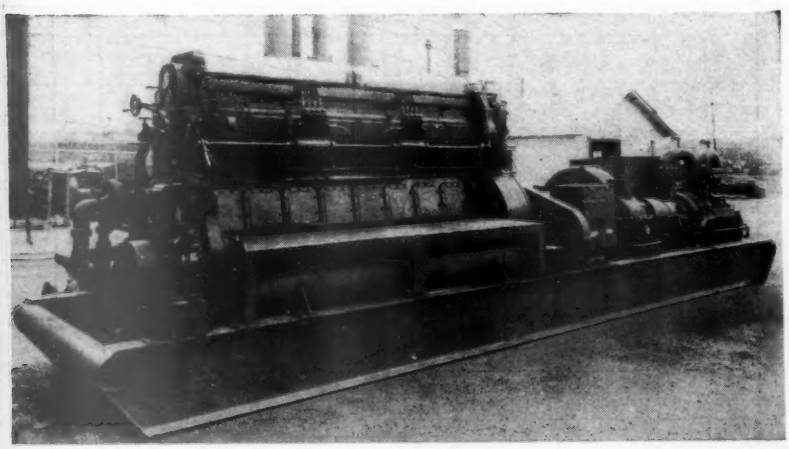
During the completion of the wells with the double side-door choke, casing opposite both zones is perforated and then the tubing and control-head packer and choke landing nipple run. The control-head packer is opened to permit displacement of the mud by water and the water by oil and the washing of both zones. The packer is then closed and the two zones acidized and tested independently by merely manipulating the double side-door choke.

The taking of bottom-hole pressures from either zone is obviously a simple matter. After testing one zone, the position of the choke is changed so that the fluid from the second is admitted to the tubing and the pressure bomb run a second time.

Stanolind Builds Large Pipe-Line Pumping Unit for Temporary Use

RATHER than wait for the arrival of new pumping equipment due from manufacturers later in the year, Stanolind Pipe Line Co. has installed a temporary portable unit at the Lakenon station in North Texas in connection with a program for increasing the flow of crude northward.

The unit was constructed at the company's shops in Tulsa where a heavy substantial base of 18-in. "I" beams, 26 ft. 3 in. long and 7 ft. 6 in. wide, was built on which a 280-hp. at 650 r.p.m. eight-cylinder Cooper-Bessemer engine was mounted, connected by a Worthington 6 by 4 centrifugal pump, delivering 700 bbl. per hour at 700 lb. pressure. The engine was converted from operation with natural gas fuel to diesel operation which is possible with engines of its type.



Pipe-line pumping unit for moving 700 bbl. per hour of 700-lb., showing details of frame construction at the end mounting the 280-hp., 650-r.p.m. engine converted from gas to diesel operation

In making the change, the gear increaser originally used with the gas unit was retained; and a new pump was installed. Starting equipment is a 4¼ by 2¼—½-in. two-stage compressor driven by a 7½-hp. engine mounted at the front side of the diesel, with tank for air storage under the operator's platform.

A direct current 2 kw. generator is driven by V-belt from the flywheel of the engine.

Cooling Medium

The heat exchanger, mounted along the length of the base skid is connected with the discharge of the crude-oil pump; crude oil pumped through the line is the cooling medium for cooling the jacket water in the heat exchanger.

To complete this self-contained unit, there are two waste-pack oil filters, for filtering fuel oil and one for filtering lube oil, and two fabricated boxes. One box holds the necessary tools and spare parts and the other is used for storage of renewal waste packs, wiping rags and other essential supplies.

After careful leveling of the unit by means of shims placed under the heavy frame, engineers were able to stand a 5-cent piece on edge on the unit while it was being tested—noteworthy evidence of the smooth operating efficiency and perfect balance of this diesel engine and supplementary equipment. In fact, while operating at 900 lb. pressure during the test—200 lb. in excess of the desired 700 lb.—the coin still remained upright, attesting to the lack of vibration.

The company was so satisfied with the performance of this diesel unit that a second unit of similar type is under consideration.

Oklahoma Mineral Industries Conference in Tulsa

The fourth annual meeting of the Oklahoma Mineral Industries Conference will be held December 2 in Tulsa. The general theme of the program will be "Present Situation and Postwar Outlook of Oklahoma Mineral Industries." This annual conference is sponsored by the Oklahoma Geological Survey, whose director, Robert H. Dott, will review the year's activities of the Survey.

The Absorption Factor in Controlling the Absorption Process

by Randal Maass*

THE original derivation of the absorption equation by Alois Kremser was based on the treatment of a relatively lean gas in which the shrinkage through the absorbers could be neglected, that is, the volumes of gas and oil were considered constant throughout the absorbers. With no appreciable absorption, the temperatures were also considered constant throughout the absorbers. Fig. 1 lists the nomenclature used in the derivation. The derivation itself is tabulated in Fig. 2. Considering one constituent only, material balances are made around each plate and around the entire absorber. These material balances are expressed in gas concentrations, using the equilibrium-constant expression to convert liquid concentrations to gas concentrations. By combining these balances Equation 5 is obtained. Equation 6 is similar but more general expression for an absorber with "n" equilibrium plates. The term "y_o" represents the concentration of the constituent in a gas in equilibrium with the lean oil. If it is assumed that the lean oil is completely stripped of this constituent, "y_o" is equal to zero. The resulting Equation 7 gives us the fraction absorbed as a function of the term "L"/VK and the number of equilibrium plates in the absorber. Knowing these two terms the equation can be solved by means of Fig. 3. Since for any one absorber, the number of equilibrium plates may be considered constant, the fraction absorbed therein is a function of the

Mr. Maass first entered the employ of General Petroleum Corp. while studying for his master's degree at University of Southern California. Following 2 years spent with the alkali industry as a chemist, he rejoined the company in 1934, and served successively as chemist, gas engineer and assistant superintendent of the gas department. In September 1943 he was transferred to the company's refining department as refinery engineer, in which position he will be active in the company's newly built alkylation and Thermofor cracking processes for the production of 100-octane aviation gasoline. Mr. Maass has been active for several years in the California Natural Gasoline Association, having served as program chairman, and as a member of various committees.

*Refinery engineer, General Petroleum Corp. of California. A slightly abbreviated version of a paper presented at eighteenth annual fall meeting of California Natural Gasoline Association, Biltmore Hotel, Los Angeles, Calif., November 5, 1943.

FIGURE 1
NOMENCLATURE FOR ABSORPTION EQUATION DERIVATION

L = Mols of oil
V = Mols of gas
y = Concentration in the gas phase
x = Concentration in the liquid phase
K = Equilibrium constant y/x
A = Absorption factor L/VK
n = Number of equilibrium plates

Subscripts
o refers to the lean oil
1,2,3 or 4 refers to gas from or oil from the plates numbered from the top of the absorber
w refers to the wet gas

FIGURE 2
DERIVATION OF THE ABSORPTION EQUATION

1. $V(y_2-y_1) = L(x_1-x_o)$ Material balance around plate No. 1
2. $K = y/x$ Definition of equilibrium constant
3. $V(y_1-y_2) = L\left(\frac{y_2}{K}-\frac{y_1}{K}\right)$ Material balance around plate No. 1
4. $(y_1-y_2) = \frac{L}{VK}(y_1-y_o)$ Material balance around plate No. 1
   $(y_2-y_3) = \frac{L}{VK}(y_2-y_1)$ Material balance around plate No. 2
   $(y_3-y_4) = \frac{L}{VK}(y_3-y_2)$ Material balance around plate No. 3
   $(y_4-y_5) = \frac{L}{VK}(y_4-y_3)$ Material balance around plate No. 4
   $(y_w-y_1) = \frac{L}{VK}(y_4-y_o)$ Material balance around a 4 plate absorber
5. $\frac{y_w-y_1}{y_w-y_o} = \frac{\left(\frac{1}{VK}\right)^5-\left(\frac{1}{VK}\right)}{\left(\frac{1}{VK}\right)^5-1}$ Absorption Eq. for a 4 plate absorber
6. $\frac{y_w-y_1}{y_w-y_o} = \frac{\left(\frac{1}{VK}\right)^{n+1}-\left(\frac{1}{VK}\right)}{\left(\frac{1}{VK}\right)^{n+1}-1}$ Absorption Eq. for "n" plate absorber

FOR A COMPLETELY STRIPPED OIL

7. $\frac{y_w-y_1}{y_w} = \text{Fraction absorbed} = \frac{\left(\frac{1}{VK}\right)^{n+1}-\left(\frac{1}{VK}\right)}{\left(\frac{1}{VK}\right)^{n+1}-1}$
8. $A = \frac{1}{VK}$
9. $\text{Fraction absorbed} = \frac{A^{n+1}-A}{A^{n+1}-1}$

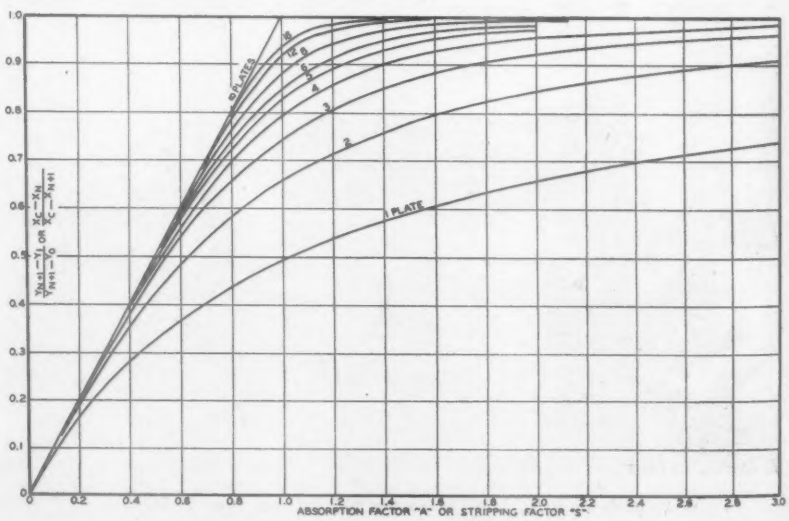


Fig. 3

term "L"/VK alone. This term, upon which the fraction absorbed depends. Mr. Kremser has called the absorption factor or "A".

Significance of the Absorption Factor

The practical conclusion that may be drawn from the absorption equation is that if the term "L"/VK is maintained constant in any one absorber the fraction of the constituent absorbed will also remain constant. Analyzing the term "L"/VK we see that it is made up of two parts, the oil to gas ratio "L"/V and an equilibrium constant "K".

The "L"/V oil to gas ratio, if you remember the nomenclature in Fig. 1, is expressed as a ratio of the mols of oil to the mols of gas. In the plant, however, oil-to-gas ratios are measured as gallons or barrels of oil per Mcf of gas. These ratios can be readily converted to the molal ratio by the following expression:

$$\frac{L}{V} = 3.16 \frac{d}{M} \frac{O}{G}$$

Where

d = Specific gravity of the lean oil at 60° F.

M = Molecular weight of the lean oil.

O/G = Gallons of oil per Mcf of gas.

Refinery engineers can multiply the constant in the above equation by 42, if they wish to express the oil-to-gas ratio in barrels per Mfc. The term "d"/M is readily evaluated since the gravity of the oil is easily obtained and the gravity together with the boiling range will furnish the molecular weight from a chart such as the one presented in Fig. 4.

The second part of the absorption factor, or "L"/VK term, is the equilibrium constant which depends upon three variables: namely, the constituent under consideration, the pressure, and the temperature. Curves of equilibrium constants for the various hydrocarbons as functions of temperature and pressure have been published in the literature. One such curve for isobutane is presented in Fig. 5.

The expression for the absorption factor may now be written in the following more practical form:

$$A = 3.16 \frac{d}{M} \frac{O}{G} \frac{1}{K}$$

Application to Control

Analyzing the above expression we see that the absorption factor depends upon five variables; namely, the quality of the oil, the oil-to-gas ratio, the absorber pressure, the absorber temperature, and the constituent under consideration. In operation, however, most of these variables can be kept constant or very nearly so. We can eliminate one variable by focusing our attention only upon the key component, that is, the component we are stretching our plant, so to speak, to extract. Under the present refinery demands this key component is isobutane. If you should be interested in the absorption factors for the remaining constituents, they will be inversely proportional to their equilibrium constants.

In the operation of the absorbers the pressure is always controlled to within close limits, thereby eliminating the pressure as a variable. Also if the oil-stripping equipment is adequate, the quality of the lean oil is quite constant. With three of the variables held constant, only two remain variable; that is, the oil-to-gate ratio and the absorber temperature.

Practically speaking then, to maintain a constant percentage absorption or, what amounts to the same thing, a constant absorption factor, it is necessary to change the oil-to-gas ratio to accommodate changes in the absorber temperature due to fluctuations in the degree of cooling obtainable. The changes in absorber temperature will be reflected in changes of the equilibrium constant. To repeat, as the absorber temperature changes the equilibrium constant will change and the oil-to-gas ratio must be changed to maintain a constant absorption factor.

This balance between the oil-to-gas ratio and the equilibrium-constant changes with temperature may be handled in the plant in several ways with varying degrees of accuracy. The most precise method of operation would be to furnish the operator with the factor 3.16 d/M, which is being held constant, and with a curve or table of equilibrium constants for various temperatures. Then, as the temperature changes, the operator can select the proper equilibrium constant and can change the oil-to-gas ratio to maintain the preset constant absorption factor. For example, let us assume that we wish to extract 90 per cent of the isobutane available in the wet gas coming to the plant. Because the rich oil from the absorber will be vented at a lower pressure and partially reabsorbed in another absorber with a consequent loss of some of the isobutane originally absorbed, it will be necessary to overabsorb in the first absorber to compensate for the loss. Let us assume an extraction of 94 per cent will be necessary to compensate for the various cycle losses. Fig. 3 shows that with a four-equilibrium-plate absorber an isobutane absorption factor of 1.64 will be required to obtain this extraction. Solving the absorption factor equation for the oil-to-gas ratio the following is obtained:

$$O/G = \frac{A\,K}{3.16\,d/M}$$

Assuming we are using a 36° A.P.I. oil with a molecular weight of 174, the values of the specific gravity, molecular weight and absorption factor may be substituted in the above equation to obtain:

$$O/G = 107\,K$$

With the aid of Fig. 5 and the known absorber pressure, the oil-to-gas ratio required for an isbutane absorption factor of 1.64 may be tabulated or plotted for various absorber temperatures. Fig. 6 is such a plot

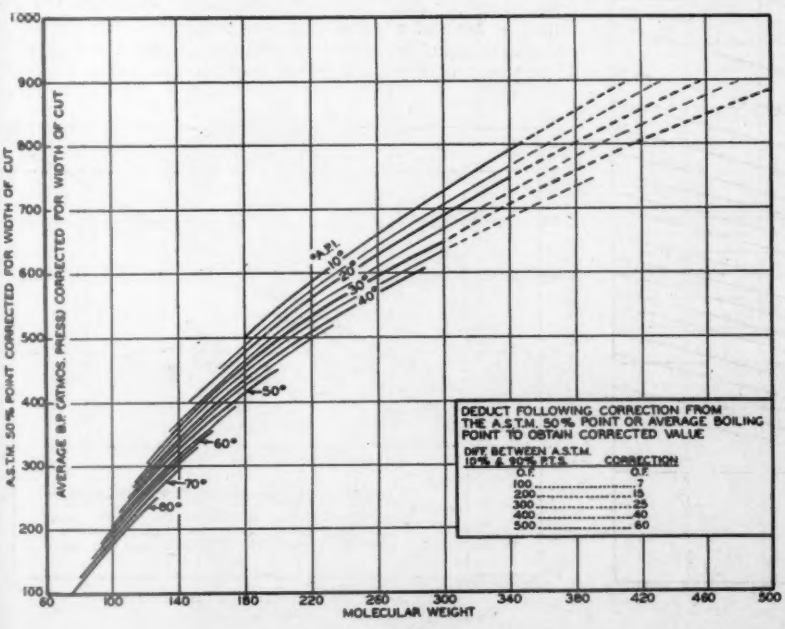


Fig. 4

based upon the data assumed above at an absorber pressure of 145 lb. per sq. in. gage. With the aid of such a plot as this the operator can readily set the proper oil-to-gas ratio for the prevailing absorber temperature.

To illustrate the effect of changes in absorber temperature on the absorption factor and also on the fraction absorbed, let us assume we are operating an absorber at 145 lb. gage and 80° F. Under these conditions a 5° change in temperature will change the equilibrium constant, and consequently the absorption factor by 8.5 per cent. If we are attempting to extract 80 per cent of the isobutane in the feed to the absorber with a four-theoretical-plate absorber, an isobutane absorption factor of 1.0 would be required. In this range the 8.5 per cent change in absorption factor would show a 3.5 per cent change in the fraction absorbed. As the extraction is increased, the effect of temperature changes diminishes. Fig. 6, on the other hand, aptly illustrates the extent to which the oil-to-gas ratio must be varied with changes in temperature in order to maintain a constant extraction.

So far we have assumed that we are treating a gas sufficiently lean so that changes in oil and gas volumes and absorber temperatures are negligible throughout the absorber. Practically, such conditions never exist; that is, there is always a shrinkage in gas volume through the absorber and a pickup in oil volume. It can be shown that the absorption equation

$$\text{Fraction absorbed} = \frac{A^{n+1} - A}{A^{n+1} - 1}$$

still holds for the conditions of finite gas shrinkage through the absorber, if the proper average value of the absorption factor A can be determined. In the remainder of the article it will be shown that at least a working average absorption factor can be determined with sufficient accuracy for control purposes.

One of the effects of a finite shrinkage and finite oil pickup through an absorber is to change, in some cases, the oil-to-gas ratio through the absorber. Thinking in terms of mols again, a balance around each plate will show that the mols of gasoline the oil absorbed must be exactly equal to that lost by the gas in passing through the plate. Bearing in mind that the oil travels down the tower and the gas up the tower, it follows that in proceeding down the tower the molal increase in oil exactly equals the molal increase in gas. Finally, at the bottom of the tower the mols of rich oil differs from the mols of lean oil by exactly the same amount that the wet gas differs from the dry gas. This increase in oil and gas can effect the oil - to - gas ratio in three different ways depending upon the magnitude of the ratio.

Consider first a molal ratio of lean oil to dry gas equal to 1.0 and a shrinkage equal to 25 per cent of the dry gas. At the top of the tower the ratio would be equal to 1/1 and at the bottom of the tower the ratio would be $(1 + 0.25) / (1 + 0.25)$, or 1.25/1.25 which is also equal to 1. Furthermore, the oil-to-gas ratio at any plate would be equal to $(1 + a) / (1 + a)$ (where a equals the pickup in liquid from the top of the tower to the plate in question) which is also equal to one. Therefore, if the molal ratio of lean oil to dry gas is equal to one, the molal ratio throughout the tower will be constant and equal to 1.

On the other hand, if our molal ratio of lean oil to dry gas were 2/1 with the same shrinkage, the ratio of rich oil to wet gas would be 2.25/1.25, or 1.8. By a similar reasoning the ratio would decrease from the top to the bottom of the tower until the ratio of 1.8 is reached. Considering a lean-oil-to-dry-gas ratio of 0.5/1, the opposite effect is obtained, with the final rich-oil-to-wet-gas ratio attaining a value of 0.75/1.25, or 0.6. This can be summarized by saying that if the molal ratio at the top of the absorber is equal to 1.0 the ratio will remain constant throughout the tower, if the top ratio is greater than 1.0 the ratio will decrease down the tower, and if the top ratio is less than 1 the ratio will increase down the tower. The effect of the shrinkage will be greater the further the ratio is removed from "o/e". For our purpose, that is for the purpose of control, no excessive refinements are necessary to obtain a satisfactory average oil-to-gas ratio. The simple arithmetric average of the top and bottom ratios, that is the lean-oil-to-dry-gas ratio and the rich-oil-to-wet-gas ratio, suffices for a working-average ratio to control the absorption of the key component. Although we are focusing our attention entirely upon the key component, the absorption of the other components takes care of-

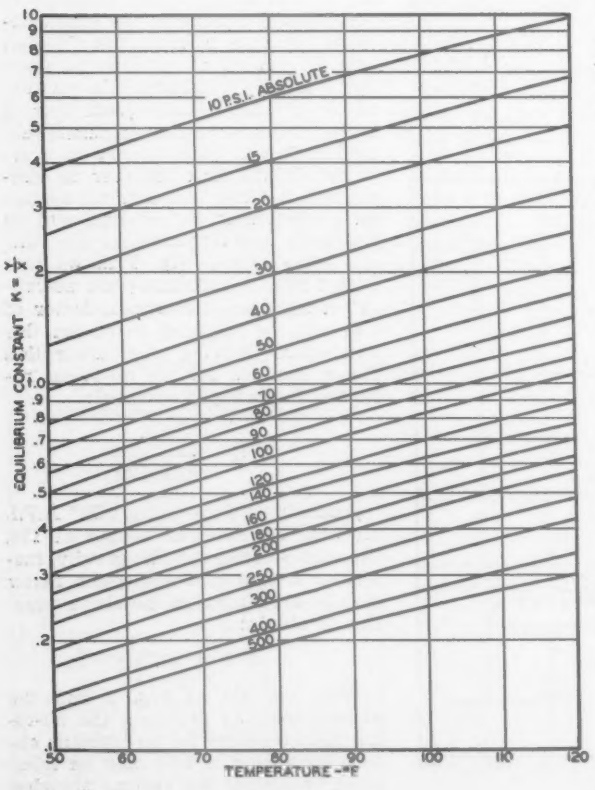


Fig. 5

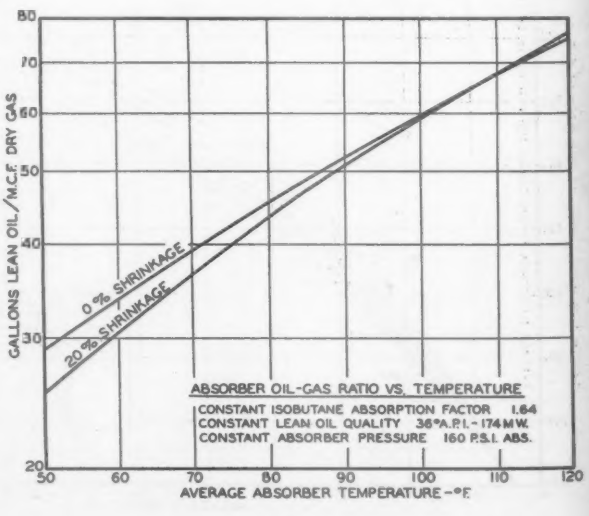
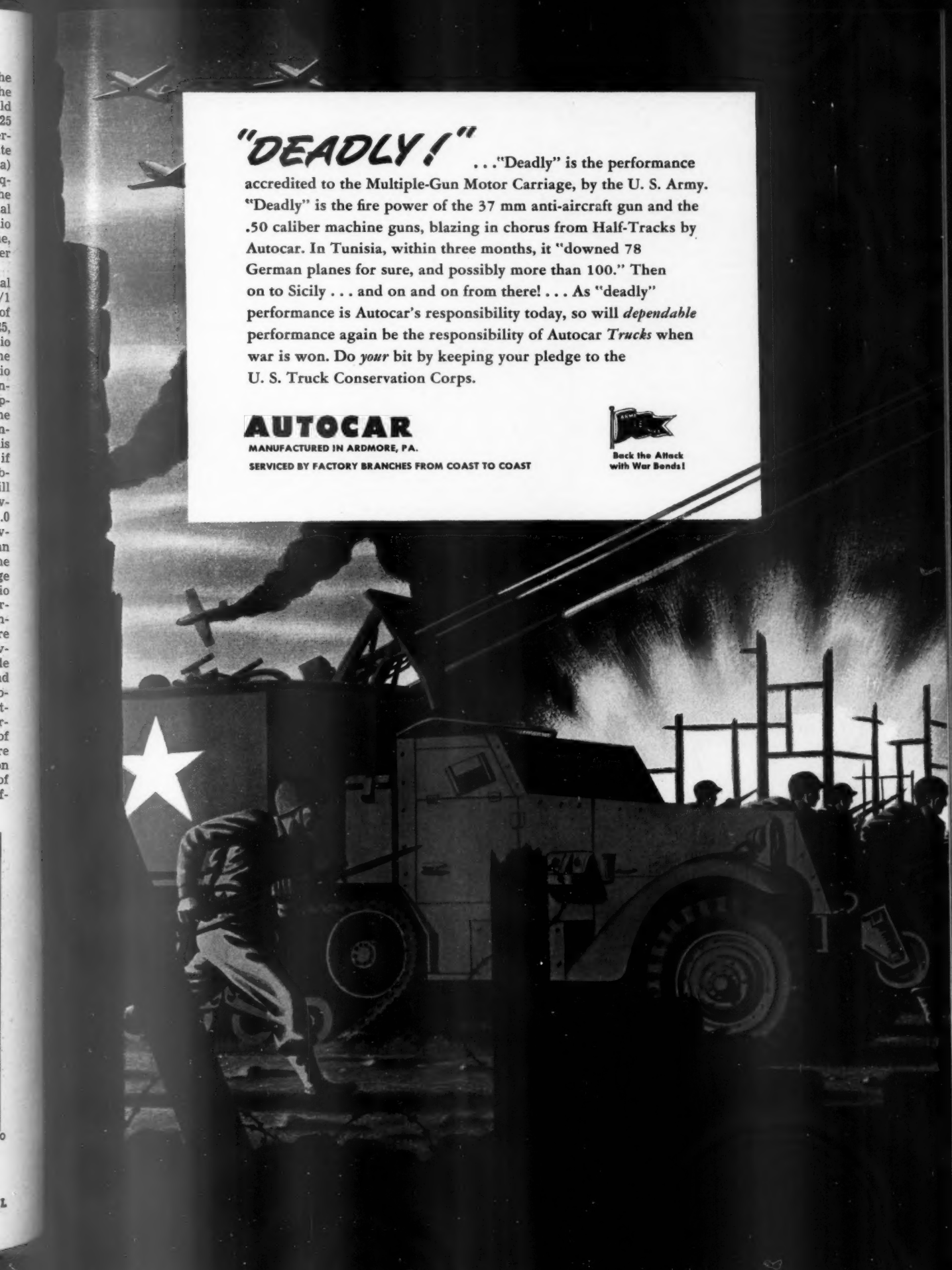

GALLONS LEAN OIL/M.C.F. DRY GAS
AVERAGE ABSORBER TEMPERATURE - °F
0% SHRINKAGE
20% SHRINKAGE
ABSORBER OIL-GAS RATIO VS. TEMPERATURE
CONSTANT ISOBUTANE ABSORPTION FACTOR 1.64
CONSTANT LEAN OIL QUALITY 36°A.P.I. - 174 M.W.
CONSTANT ABSORBER PRESSURE 160 P.S.I. ABS.

Fig. 6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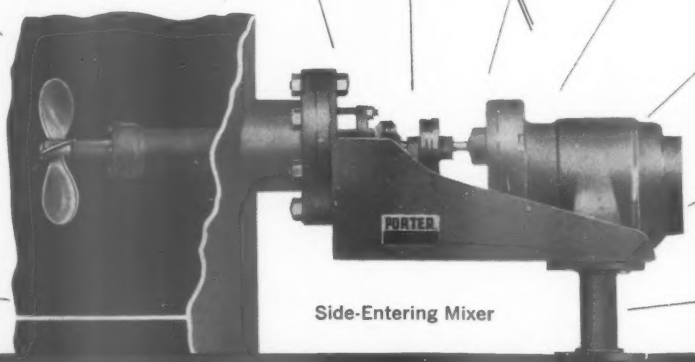

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itself, since their absorption factors are proportional to that of the key component.

To obtain the average oil-to-gas ratio indicated above, it is not necessary to meter all four streams, the lean oil, rich oil, dry gas and wet gas. It is only necessary to meter the lean oil and the dry gas and to be able to obtain the shrinkage either by metering the wet gas or by estimating the shrinkage. If the shrinkage is expressed as a fraction of the dry gas, the average ratio can be obtained by adding one-half of this fractional shrinkage to the numerator and denominator of the molal lean-oil-to-dry-gas ratio obtained from the expression

$$\frac{L}{V} = 3.16 \frac{d}{M} \frac{O}{G}$$

For example, using the same 36° A.P.I. absorber oil in a ratio of 50 gal./M.c.f. of dry gas, the average oil-to-gas ratio may be computed as follows for an absorber having a shrinkage of 20 per cent.

$$\frac{L}{V} = 3.16 \frac{d}{M} \frac{O}{G} = 3.16 \times \frac{0.844}{174} \times 50 = 0.766$$

$$\left(\frac{L}{V}\right)_{\infty} = \frac{0.766 + 0.1}{1 + 0.1} = 0.787$$

The same computation may be made beginning with the rich-oil-to-wet-gas ratio. In this case, however, the shrinkage must be expressed as a fraction of the wet-gas volume. The use of the lean-oil-to-dry-gas ratio is preferred because both the lean oil and the dry gas can be metered more accurately than can the rich oil or wet gas. In addition, especially in refinery operations, the dry-gas volumes are much steadier than are the wet-gas volumes. From the above discussion we can see that the lean-oil-to-wet-gas ratio, often used in controlling absorbers, does not exist anywhere within the tower and can, therefore, lead to erroneous results.

The finite shrinkage through an absorber also raises the temperature of the oil as it passes down the tower due to the sizable heat of absorption. By the same reasoning used above, the average of the temperature on the top plate and the bottom plate can be used as an average absorber temperature for control purposes.

If these temperatures are not obtainable, the dry gas and the rich oil temperatures can be assumed to reflect the temperatures of the top and bottom trays, respectively. If intercoolers are used, such temperature changes should be recognized in computing the average tower temperature.

It is apparent that the above computations are too complex to be used by the operators in the plant. Therefore, we must still control the absorbers by means of the lean-oil-to-dry-gas ratio, leaving the more involved computations for the operating engineer. To illustrate, we will recompute the data of Fig. 6, assuming a shrinkage in the absorber equal to 20 per cent of the dry-gas volume. The absorption factor equation can be written to include the shrinkage correction as follows:

$$A = \frac{\left(3.16 \frac{d}{M} \frac{O}{G} + \frac{S}{2}\right) \frac{1}{K}}{1 + \frac{S}{2}}$$

Where:

S = the shrinkage expressed as a fraction of the dry-gas volume.

This equation can be solved for the oil-to-gas ratio to obtain:

$$\frac{O}{G} = \frac{AK\left(1 + \frac{S}{2}\right) - \frac{S}{2}}{3.16 \frac{d}{M}}$$

Substituting the data used previously and in addition a value of S = 0.2, there is obtained:

$$\frac{O}{G} = 117.7\,K - 6.5$$

The lean-oil-to-dry-gas ratio computed from this equation is also plotted on Fig. 6 and can be compared with the ratio computed by neglecting the shrinkage. Note that at a lean-oil-to-dry-gas ratio of 65.2 the two curves give the same result; that is, the finite shrinkage does not affect the oil-to-gas ratio required. If you will check the data you will find that at this ratio the molal ratio is equal to 1 and constant throughout the absorber. As the ratio decreases or increases the shrinkage effect becomes more pronounced.

To use the above curve the operator must determine the average tower temperature. Having determined this temperature the proper ratio can be selected. It is assumed, of course, that the shrinkage is sufficiently constant so that changes in its effect are negligible.

To arrive at the percentage plant extraction we recommend measuring, sampling, and analyzing all the plant outlets. By converting each constituent of the gasoline to its equivalent standard gas volume, the plant outlets may be added together in the proper proportion to obtain the volume and analysis of the wet gas. Having these, the percentage extraction and percentage losses at each point may be readily ascertained. This method of obtaining the wet gas analysis and volume circumvents the almost insurmountable difficulties encountered in the metering and sampling of very rich gases. The difficulties arise from the tendency of these rich gases to deposit condensate in the lines even after they have been passed through a scrubber. In addition, the wet-gas streams to the absorbers often contain one or more plant recycle streams which of necessity would have to be subtracted from an analysis of these streams to obtain the net wet gas to the plant. By analyzing the outlets on samples obtained over a 24-hour period, and by holding any accumulation within the system to a minimum, you can be reasonably sure of obtaining a representative analysis of the net wet gas to the plant by adding up the outlets in their proper proportion.

Summary

The derivation of the absorption factor has been reviewed briefly to illustrate the significance of the absorption factor. It has been shown that the absorption factor properly combines the operating variables into an entity which can be correlated with plant performance. In addition several methods for controlling absorbers in the plant are outlined.

BOOK REVIEWS

SALVAGE MANUAL FOR INDUSTRY. Published by Technical Service Section, Industrial Salvage Branch, Salvage Division, War Production Board. For sale by Superintendent of Documents, Government Printing Office, Washington, D. C. 243 pp. .50c.

This manual has been prepared by an editorial board and numerous contributors, as a guide to industrial plant salvage managers. It contains instructions regarding efficient salvage methods and practices for segregating and preparing secondary waste materials. Many salvage methods or practices, often including an ideal procedure, are described throughout the manual.

PIPE & TUBE BENDING HANDBOOK. First Edition. Published by Copper & Brass Research Association, 420 Lexington Ave., New York 17, N. Y. 80 pp.

This handbook presents practical methods for bending pipe and tubes of copper, brass and related alloys. Information has been gathered from a variety of sources. The volume is copiously illustrated.

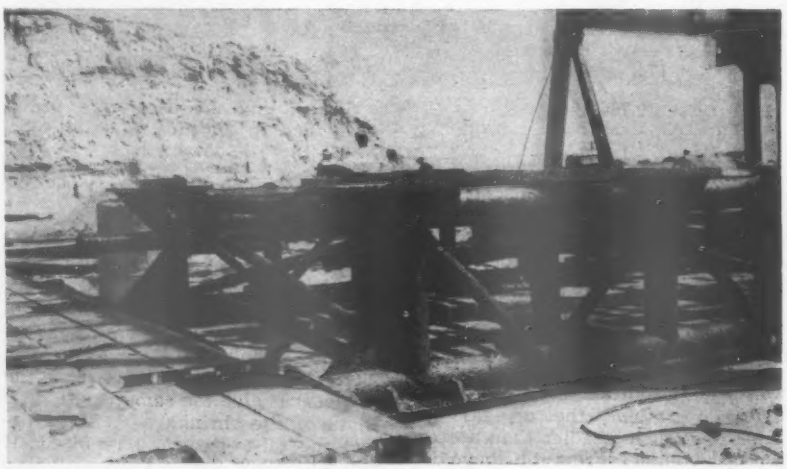
Fabricated Foundation Supports Substructure of Draw Works and Engines

ACCESSORIES for mechanical drilling tools, or for steam-driven units for that matter, can be of great assistance when tearing down, moving and rigging up again after shipping to the next location, if these accessories are engineered to perform as an integral part of the hoist and power units. A prominent integrated oil company operating several strings of rotary tools in various producing areas of California has worked out the details and built facilities, for a gas, gasoline or butane engine-driven string of tools for medium-depth wells, which have been instrumental in saving much valuable time.

The draw works and internal combustion engines are installed on individual skid-type bases, which have been mounted permanently on a tailored substructure. This substructure is made with a pair of flat, sled-type sills superimposed by a rectangular frame constructed of pipe, cross-braced and reinforced with welded gusset plates, completed with top sills of substantial I beams. The draw works and engine skid-type bases are set on these top sills at right angles to the length of the rectangular frame. Clamps and locking devices hold the engines and draw works in perfect alignment, and the entire assembly is commonly moved as a single unit.

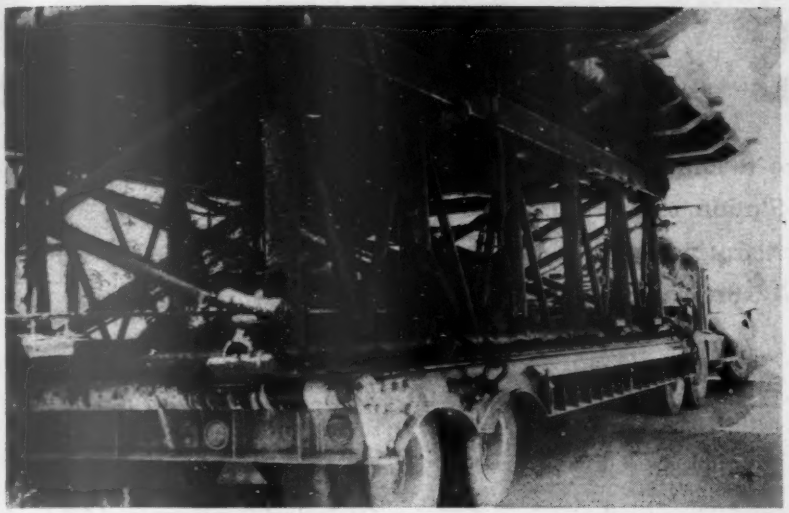
As a supplemental and necessary part of this rig, there is supplied a substructure foundation to fit between the rectangular frame and drilling unit and the ground, or concrete pad at the well. The derricks used with this type of supporting structure for the engines and draw works are all furnished with a structural steel grill foundation designed to rest on wood mats or concrete pads without derrick piers, and the floor sills are placed in the derrick to equal the height of the engine substructure and the substructure foundation. Two heavy structural steel I beams are inserted in the grill of the derrick supporting members on the side where the draw works and engine assembly is placed. These operate as additional sills to more adequately support the draw works assembly substructure foundation.

The substructure foundation is built with flat, sledlike bottom sills with short pipe risers connecting to horizontal upper pipe sills equipped with regularly spaced flat bearing plates. Connecting members of drill pipe and heavy tubing are welded from each sill to the opposite one, both top and bottom, while diagonal braces are set between the short pipe risers.



Below: Derrick end of substructure foundation showing guides on top sill which direct the drilling unit to the required place while it is being removed from the low-bed trailer with a winch to the well and offset which lies against and upon derrick I-beams placed on timber mats or concrete pad. Arrow points to roller rise. Right: Outer end of foundation for drilling rig showing half-unions for connecting service piping to pumps

Between each of the flat bearing plates on the top sills are adjustable roller risers set through slots to hold them vertical. Slots at the base of the roller riser retaining pipes are cut to receive tapered wedges to raise the rollers slightly above the flat bearing plates so that when the drilling machine substructure is slipped onto the foundation, the entire assembly will roll freely into the desired operating position. Narrow vertical retaining plates are welded to the outside of opposite bearing plates to guide the substructure into position. Holes bored into the bearing plates to match similar holes in the sled-runner type bottom sills of the substructure receive dowel pins, or



Substructure which supports Wilson drilling rig while in use at a well and on the road when transferred by low-bed trailer. Substructure is normally an integral part of this outfit and is seldom, if ever, removed

retaining machine bolts to clamp the unit in position.

The substructure foundation is built with an offset end to raise the sled member at that end over the derrick grill I beams so that the weight of the tools is uniformly distributed over the entire length. Once the tools have been winched into position, and as the dowel pins are inserted, the wedges below the roller risers are knocked out, lowering the substructure on the flat top guide and supporting plates. The application of cup grease to the bearing plates frequently is sufficient to permit sliding the structure onto the foundation without resorting to the use of the rollers.

Metal guides and retaining loops are welded into the substructure foundation through which are passed commodity and process lines, all of which are equipped with flanges and unions for rapid connection to mud lines and water supply pipes. When the well is drilled on an inside location, where production is known to exist, a substantial concrete apron, or mat, is poured to support the drilling tools and the derrick, as well as to be used later for setting a pulling machine or remedial tools when performing a workover, months, or even years later.

The complete drilling rig, with the exception of the mud pumps, the derrick and mud tanks can be transferred from one location to another with two trucks. The vehicle which hauls the draw works, drilling engines and substructure has a specially built low-bed trailer with 16 wheels on axles under the rear end. It has a perfectly flat top with a roller at the rear to expedite loading and unloading. The whole outfit, substructure, substructure foundation, derrick and truck trailer are designed so that when the load is backed to the location, the top of the truck bed is practically flush with the top of the substructure foundation, and, when the drilling tools have been winched in place on the foundation, the draw works is in correct alignment with the rotary table.

Recovering Used Tank Plates

NEW tanks are hard to obtain, even under the highest priority. Gulf Oil Corp. needed a large number of rundown and product tanks for some of the new units going in. Consolidation of lease and other field and terminal tanks by the pipe-line department left a number of large and medium-sized tanks not in use or used only intermittently. The refining company bought from the pipeline department a number riveted tanks, cut out the rivets to separate the plates and shipped them to Port Arthur in railroad gondola cars.

A special bed or table was built to support these tank plates. Around the outer edge of this table, shown in the illustration, runways were built to handle moving cutter torches in straight lines when they were clamped down on the table. The plates were either rolled or pressed flat in a shaping press, or were weighted flat by placing heavy metal beams on them, with sufficient weight to flatten them. Adjusted exactly in place, the automatic cutter torches are started, propelled by the gases as they enter the torch mechanism at the rate desired by the operator. On this ½-in. plate plain carbon steel material they were adjusted to advance at 16 in. per minute, and set to cut off the outer strip on each end and each side of the plate in which the now useless rivet holes are. Some of these edges are cut perpendicular to the face of the plate; others, especially ends, are cut on a bevel to facilitate welding.

These sheets, free of rivet holes, cut and beveled to size and rolled to proper curve, are being welded together to make up 38 "new" tanks for use in new refining units.

Automatic cutting torch recovering and reconditioning used plate

ABSTRACTS

of papers presented before a joint session of the Gulf Coast, East Texas College Station, and the University of Texas sections of the American Institute of Mining and Metallurgical Engineers, Austin, November 12 and 13.

Salt Water Disposal Program In the East Texas Field

L. H. DIAL, Chief Engineer, East Texas Salt Water Disposal Co.

THE East Texas field was recognized as a water-drive field early in its development. Operators agreed it would ultimately produce large quantities of salt water in the normal process of draining the underground reservoir of oil. In an active water-drive field, it is possible to maintain reservoir pressure by limiting the withdrawal of fluid to a value equal to the rate of water encroachment.

There are at present 61 salt-water disposal wells in the East Texas field. East Texas Salt Water Disposal Co. owns and operates 22 wells and other companies operate 39 wells.

The heart of the disposal system is the disposal well. East Texas Salt Water Disposal Co. has completed its wells in several different ways, but has now more or less adopted the following procedure:

1. The surfoce hole is drilled to approximately 110 ft., where 10¾-in. casing is set and cemented with 50 sacks of cement.

2. After cement has set a minimum of 24 hours, a 9⅞-in. hole is drilled to the top of the Woodbine sand, at which point the diameter is reduced to 6¼-in. and the hole carried to the base of the sand.

3. An electric log is then run and the casing seat selected at the base of the first shale break below subsea depth 3,320 ft., which was the original oil-water interface.

4. Seven-inch casing is then run to the casing seat and cemented with 150 sacks of cement. After the cement has set a minimum of 48 hours an official Railroad Commission test is made.

5. If the casing test is satisfactory, the cement plug is drilled and the 6¼-in. hole from the casing seat to the total depth is underreamed to 3 in. in diameter. The underreaming is done by reverse circulation using gas lift to remove cuttings.

6. The well is then flowed by gas lift until thoroughly cleaned.

7. A string of 5-in. outside diameter cement-lined tubing, the bottom of which is equipped with a hookwall packer, is run in the hole and the packer set as near the bottom of the 7-in. casing as is practical. The well is then completed for the disposal of salt water.

Corrosion is an ever-present problem. Pipe lines, pumps, and indeed all the equipment which comes in contact with salt water must be designed to withstand severe corrosion. Asbestos cement pipe has been found to be particularly suitable in the handling of salt water. In addition to being corrosion resistant, it also offers immunity to tuberculation and electrolysis, two forces which also reduce the useful life of pipe.

Another kind of pipe which has been used with success in a limited field of application is a wood-fiber coal-tar product. It is corrosion resistant also, but it cannot be used except on gravity lines and then only where the pressure does not exceed 15 lb. per sq. in.

Where high pressures are required, cement-lined steel pipe has been found to be most satisfactory. The cement lining protects the steel from the salt water on the inside, but the outside is subject to soil corrosion. Laid in ground impregnated with salt water, the steel cement-lined pipe has a very limited life as compared to either the asbestos cement pipe or the wood-fiber coal-tar pipe.

Waters From the Frio Formation Texas Gulf Coast

F. W. ROLSHAUSEN and F. W. JESSEN, Humble Oil & Refining Co.

OIL-FIELD brines have been studied for many years in an attempt to solve some of the geologic and production problems encountered in the production of oil and gas.

It is the purpose of this paper to present data on brines occurring in the Frio formation of the Texas Gulf Coast, and to show how their composition varies; (1) with depth below the surface; (2) with depth below top of the formation, and (3) along the approximate strike.

The brines vary in chloride content from 3,180 to 73,000 p.p.m. though the average salinity of the salt waters is shown to vary with total depth; the concentration being 35,000 to 40,000 p.p.m. at 4,500 to 5,500 ft. and above 50,000 p.p.m. chloride at 5,500 to 6,500 ft.

From the analyses available, it appears that highest concentration of salts occurs in the 300 ft. of the formation, while lower salinity is found with increasing depth below this point.

The salt waters from wells in Starr County show less concentration of dissolved salts than in any other group of wells farther north along the strike.

In all, 88 analyses from 5 fields and 4 wildcats, from depths ranging from 2,500 ft. to 11,400 ft. below the surface and from 2 ft. to 2,686 ft. below the top of the Frio, are recorded.

Geological Significance of Oil-Field Waters and Their Relationship to Structure and Production

WALTER R. BERGER, Consulting Geologist and Engineer.

STUDY of the chemical analyses of oil-field waters has shown that in some geologic basins there is apparently a relation between the concentration of the water and the configuration of the basin. The total solids increase basinward and are less on structural highs than in adjacent synclines. The constituents vary sufficiently to infer structural areas and possibly production of oil. Additional study may prove the relations that are to be anticipated in many basins, thereby giving the oil industry a new tool in oil exploration.

Microorganisms in Oil-Field Waters

FRED BARCLAY and F. B. PLUMMER, University of Texas.

CHEMICAL changes in oil-field brines brought about by aeration and action of minute organisms is described, and an attempt is made to evaluate how much the chemical changes are due to physical conditions such as changes in pressures, temperature and artificial aeration, and how much is due directly to life processes of microorganisms. With this purpose in view, temperature changes in the water, rate of flow of the brine, changes in the pH of the brine, changes in the concentration of the HCO radical, changes in the concentration of the H_2S in solution, changes in the concentration of soluble-iron compounds with time and with distance traveled from the well, have been measured and evaluated. Some attempt has also been made to study the relative efficiency of different types of aeration methods, of chlorination methods, and of filtration methods in removing precipitates from the brine.

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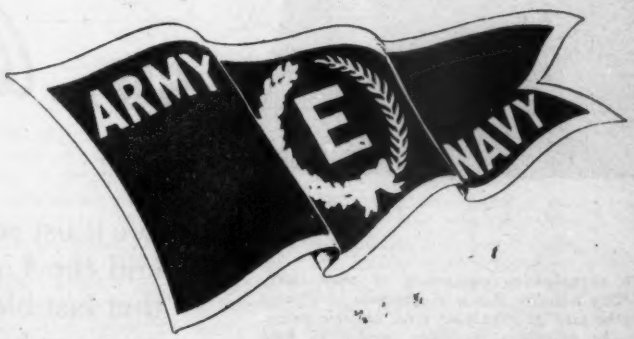

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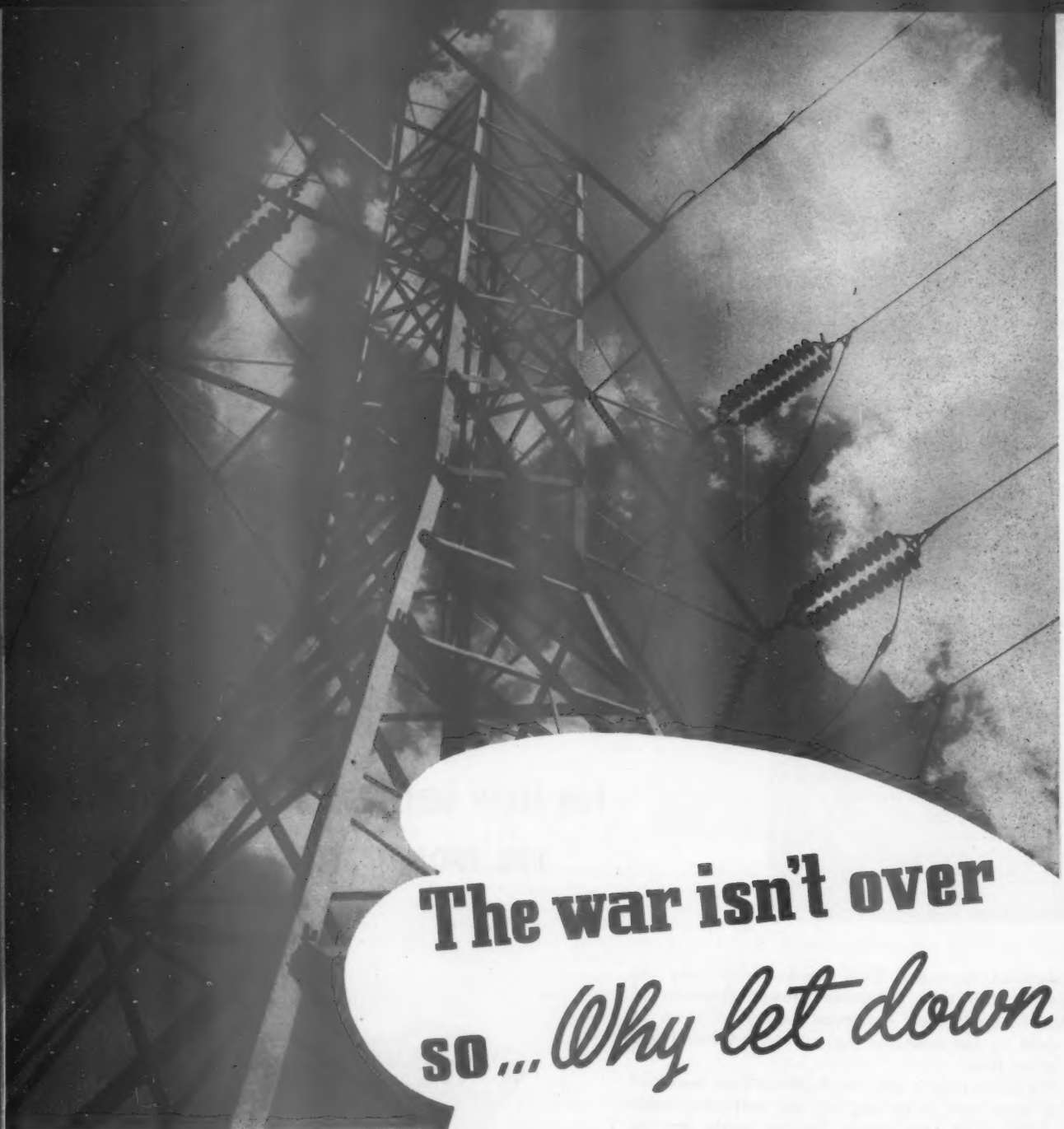

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Oil-Well Pumping Practices—No. 19

Counterbalancing of Unit Pumping Installations

by J. Zaba

Counterbalancing is probably one single feature of the surface equipment which contributes more than any other to the proper operation of the whole pumping installation. In this installment the author presents a detailed discussion of the subject, referring to the types used on unit installations.

IN Installment 14 of this series, general principles and purposes of counterbalancing were considered. While some references were made to counterbalancing of unit installations, the discussion was general in nature and its purpose was to furnish background needed for discussion of the surface equipment of a pumping installation. Discussion of counterbalancing, in this and in the following installment, refers in more detail to the types of counterbalances used on unit installations and to the methods which are employed for determination and checking of the amount of counterbalance needed. A more detailed discussion is needed and justified since, as previously stated, counterbalancing is probably one single feature of the surface equipment which contributes more than any other to the proper operation of the whole pumping installation.

An ideal counterbalance has been defined in Installment 14 as equaling the weight of rods plus half of the weight of fluid. Such a concept of counterbalance assumes that the downstroke loading of the installation equals the weight of rods. Under such an arrangement and with this assumption, the net load during both parts of the pumping cycle would be equal. Actually, however, the load on the downstroke is usually less than the weight of rods. Furthermore, the peak load occurs usually at the beginning or toward the end of the upstroke which further reduces the amount of counterbalance necessary (Installment 16). Actually therefore the necessary effective counterbalance weight needed is less than the ideal counterbalance. In many cases it is less than weight of rods alone. For an average case and for normal conditions the effective counterbalance equaling the weight of rods should provide satisfactory counterbalancing medium.[1]

The types of counterbalances most commonly used in connection with unit pumping installations are beam and rotary. Pneumatic and combination, pneumatic and hydraulic, counterbalancing methods are also being employed.

Depending on details of construction and manner of installation, each of these three groups of counterbalances can be subdivided into a number of types. The details of their construction and installation are covered amply, in the literature furnished by the manufacturers and need be considered here only in so far as they affect the characteristics of load imposed by the weights, and the manner of application of these loads.

The question of selection of type of counterbalance and of respective merits of different types of counterbalances is a highly controversial one. Fundamentally any counterbalance, if properly applied, will satisfactorily accomplish its purpose. The question of selection resolves itself, therefore, into proper application. Probably the most important point is the assurance that the type of counterbalance is being used for which the surface equipment has been originally designed. Because of difference in manner of imposition of loads by reciprocating and rotating weights, different types of loadings result in the surface equipment from the use of the beam counterbalance and different from the use of rotary counterbalance. Design of surface equipment takes into consideration these load characteristics. Selection, therefore, of the type of counterbalance for which the equipment has been designed, is essential. Other factors which may affect the selection are cost, familiarity of personnel with given type of equipment, ease of application and others. Following is discussion of beam and rotary counterbalances, which two types are used in an overwhelming majority of field installations.

Beam Counterbalance

Types.[2]—Beam counterbalances can be divided into several types, depending on the point or manner of installation of the counterbalance weights. Fig. 1 shows, schematically, the manner of installation, letters A to D denoting different and most commonly used positions of installation of the weights. Letters A and B represent positions of weights directly on the walking beam, a method of installation generally used on modern pumping units employing the beam type of counterbalance. The only difference between positions A and B is the resulting effective counterbalance at the upper pitman bearing. This difference is brought about by the difference of the respective distances of the center of gravity of weights from the point of leverage. In case of position A, Fig. 1, the effective counterbalance is larger than the weight of actual counterbalance weights used. Because of this fact, the method of installing the weights beyond the upper pitman bearing is quite generally used, although it has the disadvantage of increasing the acceleration of weights. In case of position B, Fig. 1, the resulting effective counterbalance is smaller than the weight of actual counterbalance weights used. Positions C and D, Fig. 1, represent the so-called "guided" and "grasshopper" types of beam counterbalances respectively.

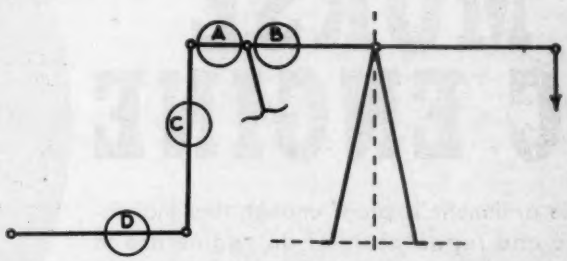

Fig. 1: Schematic drawing of weight locations for different types of beam counterbalances

Counterbalance effect.—In case of beam counterbalance, the effective counterbalance is a function of operating speed. The changes of speed of operation affect the rate of acceleration and deceleration of mass of counterbalance weight, resulting in changes of effective counterbalance. These changes can be expressed by

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formula (Installment 14):

$$C_E = C \pm \frac{c}{g} a$$

Where

C_E = effective counterbalance lb.
C = actual counterbalance lb.
g = acceleration of gravity 32 ft./sec.²
a = vertical acceleration ft./sec.²

Since the rate of acceleration is directly proportional to the distance from the pivotal point of the beam, the acceleration of weights will be reduced by weight arrangement E-E shown on Fig. 2.[2] Under this arrange-

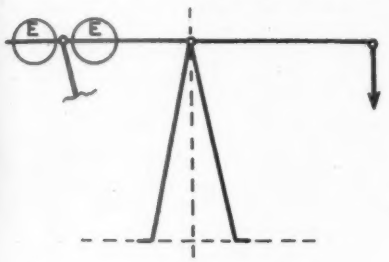

Fig. 2: Weight position to decrease acceleration of mass of weights

ment, the center of gravity of weights coincides with center line of pitman bearing. Both from the standpoint of beam stresses and from the standpoint of acceleration of weights, this arrangement is more satisfactory than weight position "A" shown in Fig. 1.

Effect on beam.[3,4]—A properly constructed and installed beam counterbalance weight does not impose adverse stresses on the walking beam. Important is the alignment of the center of gravity of weights with vertical centerline of the beam to avoid creation of torsional moments. The maximum bending moment imposed on the beam is at the beam saddle. At high operating speeds, the effect of the weights may become negative, resulting in corresponding changes of the value of the bending moments at the pitman end of the beam.

Effect on pitman.[4] — During the downward part of the stroke the pitman is in compression, with a beam type of counterbalance, while during the upstroke it is in tension. This reversal of loadings is important because of its effect on pitman bearings. The bearings must be designed in such a manner as to permit them to carry both types of loadings.

Torsional vibrations.—A number of investigations showed the presence of torsional vibration in transmitting torque through gear reducers. Effect on these vibrations, of type of counterbalance used has been analyzed, mathematically, and has been checked by experimental data on actual torque tests.[5] Results of this analysis and of these tests indicate that in case of beam counterbalance, the period of natural vibration of the reducer is normally outside of the range of operating speeds of certain prime movers. It would appear, therefore, that in case of beam counterbalance there is less opportunity for occurrence of resonant vibration which would be detrimental to the reducer. It has been pointed out, however, that vibrational problems exist also in case of beam counterbalance, since any machine element involves potential vibration problems.[6] At any rate presence of damping and proper design of equipment make this problem one of relatively minor importance to the operator of the equipment.

Effect of lack of inertia.[3]—Reapplication of the load to gears at the two crank positions at which the torque equals zero, results in development of considerable shock impact. This effect can be eliminated by use of rotating inertia on the crankshaft.

Rotary Counterbalances

Effective weight.—In case of rotary counterbalance, the relation between actual and effective counterbalance can be expressed by the formula (Fig. 3):

$$C_E = \frac{C \times D}{R}$$

Where

C_E = effective counterbalance, lb.
C = actual counterbalance, lb.
D = radius of rotation of center of gravity of weights
R = radius of rotation of crank pin

This effective weight is, in case of

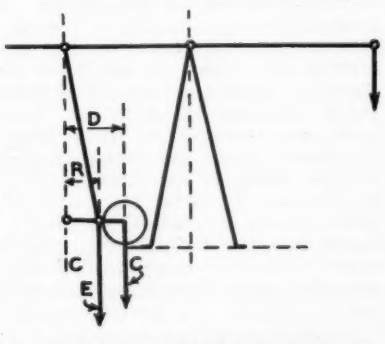

Fig. 3: Schematic sketch of rotary counterbalance

a rotary counterbalance, independent of the operating speed.

Loads imposed. — For rotary counterbalance the pitman is always in tension, there is no reversal of loadings as in case of beam balance. Full load of the well is imposed on the pitman and its bearings since the counterbalance, exerting the force opposing the well load, is not interposed between pitman and the well load as in case of beam balance.

Loads imposed by rotary counterbalance on crankshaft and foundation may quite severe because of effect of centrifugal force. This force, acting outward along the crank arm can be expressed by the formula:

$$F = \frac{C}{g} d\omega^2$$

Where

F = centrifugal force
C = actual counterbalance weight
g = acceleration of gravity
d = radius of rotation of counterbalance weight
ω = angular velocity of crank = $2\pi N/60$
N = number of revolutions per minute

Since the centrifugal force is directly proportional to the square of angular velocity of crank it becomes of great magnitude at higher operational speeds and decreases rapidly with decrease in speed. For instance, for the 5,000 lb. actual counterbalance weight and for 4 ft. radius of rotation of center of gravity of weights the centrifugal force would be, in round figures, 4,900 lb. for speed of 27 s.p.m. and around 2,200 lb. for speed of 18 s.p.m.

The centrifugal force exerts severe bending moments on the slow-speed shaft of the reducer.[3] Acting outwardly along the rotating crank arm it creates also continuously changing moments on the reducer itself. These forces are transferred to foundations which must be designed accordingly.

Torsional vibration.—Investigation, previously referred to, of torsional vibration in reducers suggests that the frequency of natural vibration of the reducer with rotary counterbalance is within the range of operating speeds of certain types of prime movers that, therefore, conditions of resonant vibration may occur at certain definite speeds for rotary type of counterbalance.

Flywheel effect.[7] — Because of the slow speed of the crank the flywheel effect of rotary counterbalance is negligible.

Combination Counterbalances

Summary, given above, of the characteristics of the two types of counterbalance, the beam and the rotary counterbalances, brings out the fact that each of these two types possesses certain advantages which can be utilized in a combination beam and rotary counterbalance. At the same time, the effect of certain unfavorable characteristics of each of these two types can be diminished under arrangement of combination counterbalance. For instance, since the counterbalance effect of a beam counterbalance is difficult to adjust, the beam weights may be used as a main counterbalancing body while small rotary

counterbalance can be used for adjustments. Such an arrangement would eliminate excessive loadings imposed on crank shaft and foundation by the centrifugal force of a large rotary counterbalance. It would also provide sufficient rotating inertia to diminish gear impact of reducer at the points of zero torque.

It appears, therefore, that both from mechanical standpoint and from the standpoint of counterbalancing results, combination of beam and rotary counterbalance is a most satisfactory solution. If such an arrangement is used it is important that proper amounts of rotary and beam weights are used. The proper ratio of the amounts of weights would be the one for which the unit has been designed.

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Sodium Nitrite as Corrosion Inhibitor in Gasoline Lines

by S. S. Smith and R. K. Schulze*

THIS paper will cover developments of the past year, particularly with respect to the continued usage of the inhibitor in the Shell lines and its introduction to the Plantation and Bayou systems.

The sodium-nitrite inhibitor is applied to the line in a water-borne solution, injected at each pump station with controlled rates and concentrations. As it is effective only in alkaline solution, sufficient caustic soda is added when necessary to obtain a pH value of 7, or higher, in the effluent water. Periodic observations are made on water samples collected from strainer baskets, hay tanks, or other segregation point.

Records of the Wood River-East Chicago line operations beginning shortly after its conversion from crude to products service, show clearly the action of the inhibitor. This line was constructed in 1927 and converted to products service in May 1940.

At the end of September 1942 it was decided to discontinue the running of scrapers, as it was apparent that the line was clean and further scraping would accomplish little. This conclusion has been borne out by the experience of the succeeding 12 months, wherein a high value of the C factor has been maintained through the use of the inhibitor alone.

The initial experiments conducted with the inhibitor on the Wood River-Lima line showed that the C factor fell off quite rapidly up to the start of the inhibitor program in September 1939. No marked change was observed during the early use of the inhibitor; and, because of this fact and the absence of effluent inhibitor at the downstream stations, the injection rate was increased to 4 lb. per day in September of 1940. Almost immediately a reaction was obtained evidenced by the increase in scale receipts and the steady improvement in C factor.

With the construction of the Muncie station, the Zionsville-Lima line was divided into two sections. The upstream section immediately showed a high C factor and the downstream section a correspondingly low factor. This was anticipated, and the injection rate at Zionsville was increased in May, and the necessary apparatus was installed at Muncie and placed in operation when the pump station went in service.

Scraping operations on the Wood River-Zionsville line were discontinued in November 1942, and in January 1943 on the Zionsville-Lima line.

The Plantation Pipe Line System was completed about 1½ years ago, and is one of the largest products lines in existence. The main system consists of a 12-in. line extending from Baton Rouge, La., to Bremen, Ga., a distance of 432 miles, and a 10-in. line from the latter point to Greensboro, N. C., comprising another 357 miles.

The entire system is being inhibited; however, only the 12-in. and 10-in. lines will be covered in this discussion, due to the fact that the laterals are operated intermittently.

Prior to the start of the inhibitor program each section of line showed a drop in C factor with continued operation. Improvements in C factor were evident in varying degrees after the inauguration of inhibition.

The last pipe line to be inhibited is the Bayou system, consisting mostly of used pipe from old crude lines.

Pipe used in normal crude service is seldom corroded very seriously, and in effect the crude forms a protective coating on the inner wall which prevents the formation of scale. Hence, when this protective coating is removed by scraping or other means, usually very little other than the mill scale is encountered. Consequently, when the pipe is placed in products service, marked improvement is observed almost immediately with the introduction of the inhibitor.

The amount of inhibitor used on both the Plantation and Bayou systems is quite large; hence, it is indicated that overinhibition should be maintained until scale receipts diminish and C factors approach maximum levels. The use of scrapers during this breakdown period is essential, and it is recommended that continued scraping be followed until no longer necessary. After maximum C factors have been obtained, it is advisable to maintain 1 to 2 per cent inhibitor concentration in the effluent water, and keep the amount of water in the line as low as possible.

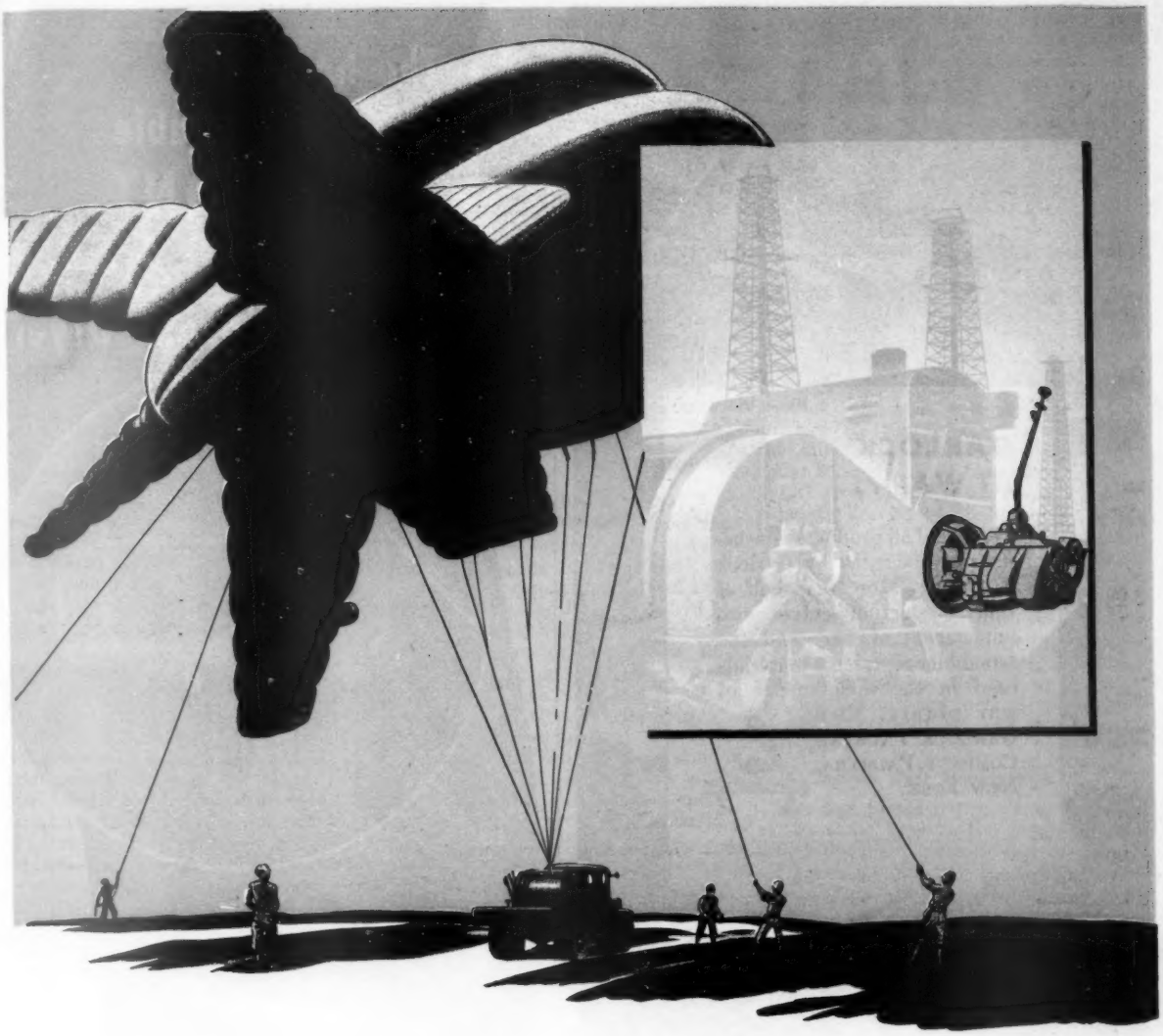
Other lines are being treated with sodium nitrite; the principal one of these is the Great Lakes system.

*Shell Oil Co., Inc.

A.P.I.

Introducing his own discussion, Mr. Smith summed up the various methods of maintaining flow capacities in product lines. He pointed out that these could be maintained either by preventive or remedial measures. According to him, most companies have used the remedial measures of scraping to remove scale formed by corrosion. He stated that successfully preventive measures are dehydration of products before pumping or the use of a chemical inhibitor. Chemical inhibitors are of two classes: Some of these are gasoline soluble which may affect gasoline specifications, and these are required in fairly large quantities; others are water soluble and are therefore not contaminating to gasoline; the latter are useful in much smaller quantities. He further stated that the accompanying paper describes the only successful pipe-line operation which maintains flow capacities without any use of scrapers.

Part of paper presented before A.P.I. meeting, Chicago, Ill., November 9, 1943, as contribution to "Symposium on Combating Internal Corrosion of Products Pipe Lines."



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PROGRESS IN METALS

by W. L. Nelson

Substitute Metals

THE latest Materials Substitutions and Supply List (July 15, 1943) indicates our main requirements are being satisfactorily met. Magnesium is now off the list of critical metals and aluminum has descended in degree of criticalness until it may, in 3 more months, be available in sufficient amounts. In review, the lists of February 15, April 15 and July 15 list critical nonferrous metals as follows:

Feb. 15	April 15	July 15
Magnesium	Aluminum	Bismuth
Aluminum	Cadmium	Cadmium
Copper	Bismuth	Tin
Tin	Tin	Copper
Cadmium	Magnesium	Zinc
Zinc	Copper	Aluminum
Bismuth	Zinc	

With regard to ferro alloys, the changes are less marked but it is notable that chromium is becoming less critical, perhaps due to completion of numerous butadiene and 100-octane gasoline plants. At the same time, columbium has become more critical. It is an imported material (from friendly nations) and the small amount of it required may be supplied by the arrival of a few shipments. The degree of criticalness of the ferro metals since February, has been:

Feb. 15 and Apr. 15	July 15
Molybdenum	Molybdenum
Nickel	Nickel
Vanadium	Columbium
Tungsten	Tungsten
Chromium	Vanadium
Columbium	Silicon
Calcium	Chromium
Silicon	

Many materials are listed as sufficient but scarcely any widely useful materials are listed as available in such quantities as to permit their use as substitutes. The metals available as substitutes as of July 15 are listed here and the list differs from ones of February and April only in that the little used metal palladium has been added to the list.

Antimony
Antimonial lead (hard lead)
Ferroboron
Ferro-carbon-titanium
Ferromanganese, high carbon
Gold
Lead
Palladium

It is noteworthy that ferro-carbon-titanium can be used for some of the purposes for which the now scarce columbium is used, namely as an ingredient of high-temperature chromium-nickel steels.

Fabrication of Pressure Vessels

A MILD steel with about 0.15 per per cent C and 0.5 per cent Mn is very suitable for pressure vessels. Opinions differ as to the maximum silicon content but it is believed that it should be as low as possible to avoid premature killing of the weld deposit with ensuing brittleness. Recently low-alloy and stainless steels have also been used. No matter what the type, the steel must be clean.

The electrode should be of a type which provides a reducing gas shield for the arc and a neutral slag over the weld deposit. Unionmelt automatic welding is being used considerably.

The first step in fabrication is the machining of the edges of the plate so that an almost parallel sided U is formed on assembly (except for Unionmelt). Then the plate is bent into a cylindrical shape. Test plates should be tack welded onto the end of the shell prior to welding so they will form a part of the longitudinal weld. Wherever possible, the work should be positioned so the operator is working in a down-hand position.

After the longitudinal welds are made, the circumferential seams are welded with the vessel rotating at the desired speed. When the welding is completed from the outside, the first run of metal is chipped out from the inside and two sealing runs deposited here. The welds are then dressed by chipping and grinding to leave a flush surface. Although this operation may remove the possibility of stress localization, it is done primarily to give more easily interpreted exographs.

Simple butt welds are most generally used in pressure vessels, and fortunately, are the easiest to test by X-rays. Lead numbers should be attached to the vessel for identification as well as small gages known as pentrameter gages to prove that the technique is sufficient to show a defect equal to 2 per cent of the plate thickness. These gages increase in steps of 0.010 in.; so, in the case of a 1-in. plate, the 0.020-in. step should be clearly visible. The X-ray shows up mainly bad penetration, porosity, cracks, and slag inclusions.

Severe distortion is often erroneously considered indicative of severe stresses, although serious locked-up stresses are more likely to occur in the absence of distortion. All boiler codes require a heat treatment of the vessel after welding, to relieve stresses and to avail of the highest joint efficiency.

Two methods are worthy of consideration: Normalizing and subcritical stress relieving. The first is less desirable because of the possibility of structural collapse at the high temperatures involved. The latter is more usual and is generally carried out by holding 1 hour per inch of thickness at 620° C. (1,150° F.) and cooling in still air.

Certain Test Requirements

The test plates which were welded at the same time as the longitudinal seams and heat treated with the vessel are cut into test specimens and must meet the following requirements:

1. Tensile properties—all weld metal specimen tensile strength not less than the minimum of the plate: elongation, 20 per cent in 2 in.; reduction of area, 35 per cent.
2. Tensile strength across joint—not less than mimimum of plate.
3. Bend across weld, 180°.
4. Izod impact: notch in junction, 30 ft. lb. minimum; notch in weld, 30 ft. lb. minimum.
5. Satisfactory micro and macrographs.

After all the operations required by the code have been performed, the vessel should be hydrostatically tested. The test pressure will be called for on the contract and is usually 1.5 times the working pressure plus 50 lb. The vessel should be blanked up so as to permit examination of all parts during the test. Care should be taken to prevent sagging due to the weight of the water. Air pockets should be guarded against.

After the hydraulic test, the vessel should be drained, any silt or scale cleaned out and a final inspection of the interior made as well as a check of the alignment, circularity, and general dimensions.

Abstracted from S. H. Griffiths, Engineering Inspection, Vol. 8, Spring 1943, pp. 4-24. Taken from Metals and Alloys, August 1943.

OPERATING IDEAS

Protection for Adjusting Bolts

CHANGES in the well conditions and in the operation of the pumping unit require adjustment of the counterbalances. Frequently it is found that the threads on the adjusting bolts holding the counterbalances in place have corroded or been damaged and can be removed only after considerable work. One company protects these threads by covering them with grease and then wrapping them with rags held in place by wire. This protective layer can be removed in a few moments when it is desired to change the counterbalancing of the unit.

Anchor for Drilling Line

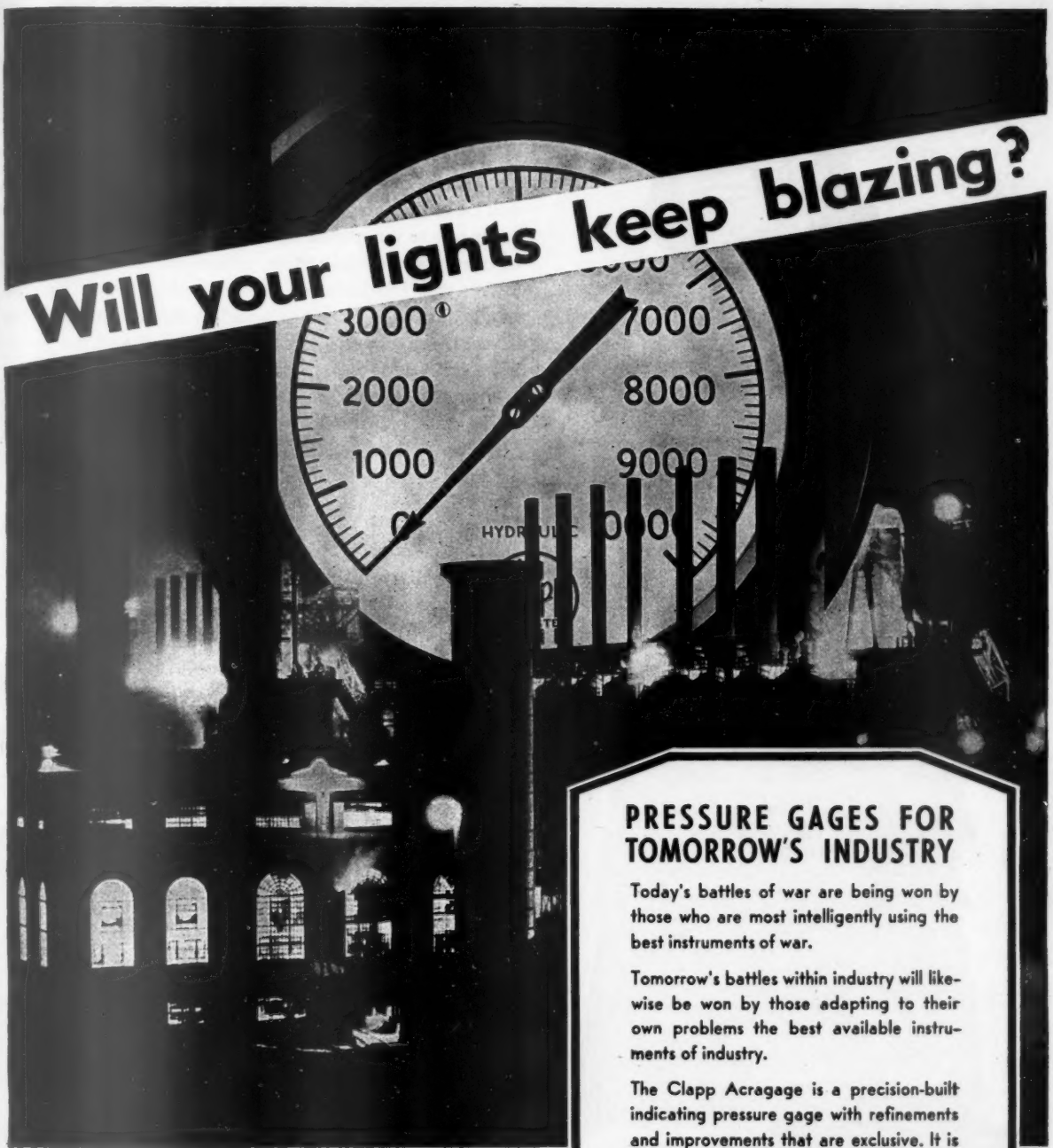
INSTEAD of looping the end of the drilling cable around a derrick sill or a ring, or bail, connected to some substantial part of the rig, a contractor saves as much of his cable as possible by setting a piece of junk pipe in the concrete mat at the side of the leg of the derrick. This piece of pipe is bent on a wide radius to supply as great a bearing surface as practicable, leaving each end a short distance above the mat, belled out so the end of the line can be threaded easily through the supporting loop. Fraying of the wire line is prevented and fatigue is reduced to a minimum.

Jacks Attached to Vehicle Frames

IF step jacks are necessary beneath heavy transportation units so frequently that several units are permanently assigned to the vehicle, they can be made very convenient when attached to sills of the chassis with hinged connections. A company using several jacks of this type has welded brackets to the frame of trucks at the points where the jacks are regularly placed. The connection on the brackets are in the form of a modified clevis just wide enough for the top of the jack to be inserted. The pad at the top of the jack is removed so the top can be inserted and retained by a pin extending through holes in the sides of the clevis and the top of the jack. A ring is welded to the heel of the jack to which a chain is linked to be used for supporting this part of the jack as it is raised so the body is approximately horizontal to pass over roads and leases without striking brush or other obstructions.

Socket for Tool Handles

CHAIN tongs, pinch bars and other long-handled tools are often leaned against the walls of buildings and the sides of the derrick. Retaining sockets are sometimes provided to support such tools, ranging from cumbersome racks to the small apparatus illustrated. The advantage of this type of tool holder is its lightness and its utility. Made by using a short section of 4-in. pipe supported on low legs at each end, the sockets are all welded into the upper side of the large nipple and are made by using 1¼, 1½ or 2-in. pipe nipples. The spread of the legs is such that the rack is not easily upset, and its lightness permits loading on a truck without using more than one man or a cane.



pressure GAGES

PRESSURE GAGES FOR TOMORROW'S INDUSTRY

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The women

They know that this is war, and that the price of victory will be high. They have sent off their sons, brothers and husbands to the armed forces, and they are coming out of beauty shops and offices, stores and homes, and are taking war jobs in steel mills and shipyards. The deft hands that in peacetime wielded the skillet and the dryer are now managing the boring mill and the welding torch—and to very good effect.

Ever try keeping traffic flowing smoothly in and out of the main entrance of a big steel plant? Ever knock a "hot top" off an ingot? Or rough-bore a gun forging? Or weld a ship's hull? Not women's work? Women are every day doing these and dozens of other jobs in Bethlehem shipyards and steel plants, and doing them superbly.

At Bethlehem and Lackawanna, at Baltimore, at Fore River and Hingham, on the Pacific Coast—and at other locations where this company operates plants and shipyards—former clerks and beauty-shop operators, saleslgirls and housewives, are applying themselves to their new, challenging tasks with wonderful spirit and skill. They are helping to swell the mighty output of steel and ships and ordnance. The results of their efforts are being painfully felt in Tokyo and Berlin. Hats off to them!

★ ★ ★ BETHLEHEM STEEL ★ ★ ★

Woman "patrolman" at a Bethlehem steel plant. Here is a job calling for plenty of tact and skill! Women are serving on patrol duty at gates, parking lots, offices, and other locations with efficiency and aplomb.

Once a dancer, now she runs a machine in a Bethlehem shipyard.

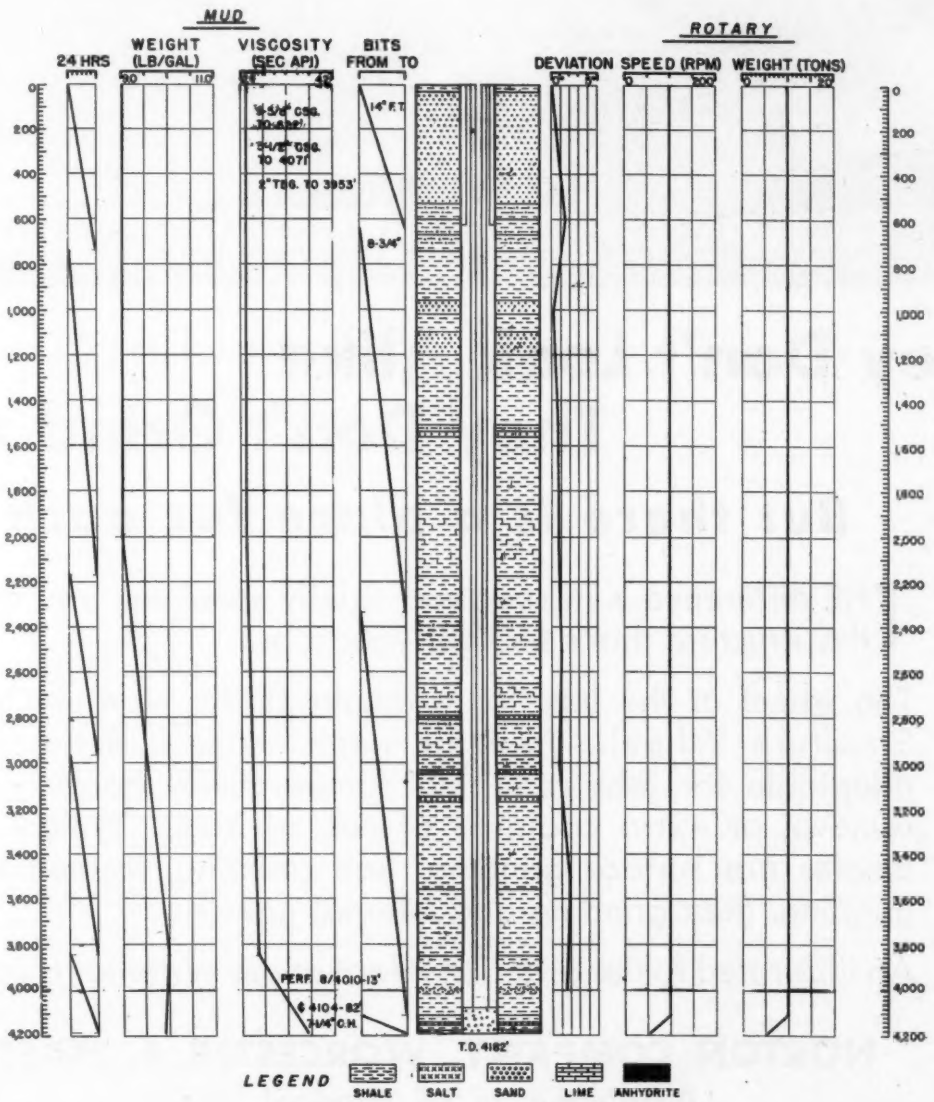
This "buggy" operator is hauling naval shells in a Bethlehem plant.

Upswept hairdo, red finger-nails, don't keep this girl welder from doing a man-size job at a Bethlehem shipyard.

Discovery Well, Porter Field, Karnes County, Texas

COX & HAMON 1 BEN JOHNSON
330 ft. out of east corner of 128.2-acre tract, Block 1, Porter Subd., Victor Blanco grant, Karnes County, Texas. Elevation, derrick floor 269 ft., ground 258 ft.

CONTRACTOR
GORMAN DRILLING CO.



DRILLING DATA

Rigging up rotary (steam)	2 days
Days drilling	5
Ran electric log	4,182 ft.
Side-wall core	3,996-4,011 ft.
Cored (12)	4,104-82 ft.

BITS USED	No.	Size (in.)
Drag bits	1	14
	2	8¾
Core head	1	7¼

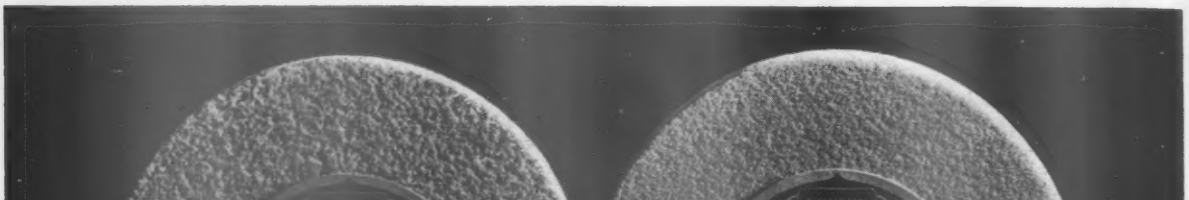
CASING AND TUBING RECORD

Size—	Weight (lb.)	Depth (ft.)	Cement (sacks)
9⅝-in.	32.0	622	350
5½-in.	14.0	4,071	250
2-in.	4.7	3,953	...

5½-in. packer at 4,020 ft.
4-in. screen and liner (52 ft.) set with packer at 4,020 ft.

COMPLETION AND PRODUCTION

Perforated casing, 8 shots	4,010-13 ft.
Choke	5/32-in.
I. P. (24 hr.)	118 bbl.
Tubing pressure	525 lb.
Casing pressure (S.I.)	1,050 lb.
Producing zone	Pettus sand
Depth	3,990-4,014 ft.
Total depth	4,182 ft.



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They Don't Grind Alike

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A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

COMPUTING WELL-SURVEY RESULTS

THE results of a directional well survey are commonly depicted graphically by plotting the course of the well bore in three projections, viz., a horizontal projection or map, a vertical projection on an east-west plane, a vertical projection on a north-south plane. The purpose of this discussion is to explain and illustrate the method by which such projections are commonly prepared.

In order to have the three-dimensional location of a point in a well with reference to any other point, (usually the mouth of the well at the surface), it is necessary that the three dimensions be calculated. The term true vertical depth will be used to refer to the vertical dimension which locates vertically a point with respect to the chosen reference point. The term latitude is another dimension which refers to the location of a given point north or south of the reference point. Departure, the other dimension, refers to the location of a given point east or west of the reference point.

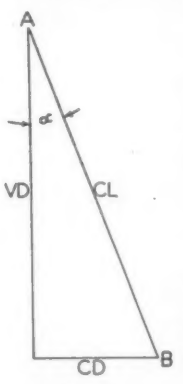


Fig. 1

Course length in this discussion refers to distance between survey points, measured along the course of the well bore. Course deviation refers to the horizontal displacement of a given survey point from an adjacent point. Referring to Fig. 1, the line CL represents the course length, which is available from well-depth measurements taken between the points A and B. The angle α represents the deviation angle, which can be measured with instruments described in earlier discussions of this series. The line VD represents the true vertical depth between points A and B, which can be computed by multiplying the course length CL by the cosine of the deviation angle α, i.e.,

$$VD = CL \cos \alpha \qquad (1)$$

The line CD represents the course deviation, and its value can be calculated by multipyling the course length CL by the sine of the deviation angle α, i.e.,

$$CD = CL \sin \alpha \qquad (2)$$

Referring to Fig. 2 the line CD represents the course deviation, as defined above, drawn on a horizontal plane along with the four points of a compass. The angle β represents the bearing angle, which is read from the record taken with a directional survey instrument or measured by orientation methods as already discussed. It is evident from Fig. 2 that the latitude can be calculated by the following equation:

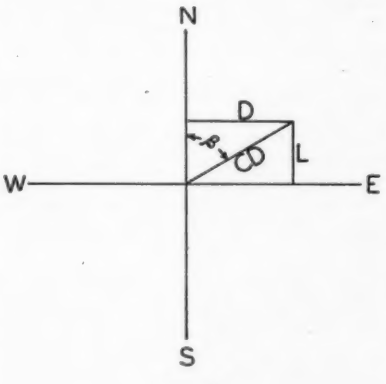


Fig. 2

$$L = CD \cos \beta \qquad (3)$$

It is also evident that the departure may be calculated as follows:

$$D = CD \sin \beta \qquad (4)$$

In arriving at the location of points in a well with reference to the mouth of the well at the surface, it is assumed that the course length between any two adjacent survey points is a straight line, (as indicated by the line CL in Fig. 1) and that the deviation angle α exists throughout the course length between the two points. Actually, this is not true since the deviation angle changes gradually. But readings are generally taken at intervals of 100 ft. or less and deviation angle changes within depth intervals of 100 ft. or less very seldom exceed 9°; so from a practical viewpoint, this assumption does not result in appreciable error.

Example

A set of hypothetical observed and calculated data is presented in Table 1. Values in columns 1, 2, 3, 4, and 10 are from observations made at the well. Values in columns 5, 8, 11, and 12 are taken from a table of trigonometric functions. Values in column 6 are obtained, according to equation

TABLE 1—OBSERVED AND CALCULATED DATA FROM DIRECTIONAL WELL SURVEY

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
												Course				Total			
					Vertical depth							Latitude		Departure		Latitude		Departure	
Test No.	Depth	Course length	Deviation angle	Cosα	Course	Total	Sinα	Course deviation	Mag. Brg., β	Cosβ	Sinβ	N	S	E	W	N	S	E	W
1	100	100	1°15′	.9998	99.98	99.98	.0218	2.18	N 8°00′W	.9903	.1392	2.16	....	....	0.30	2.16	....	....	0.30
2	200	100	1°45′	.9995	99.95	199.93	.0305	3.05	N30°30′W	.8616	.5075	2.63	....	....	1.55	4.79	....	....	1.85
3	300	100	1°45′	.9995	99.95	299.88	.0305	3.05	N50°30′W	.6361	.7716	1.94	....	....	2.35	6.73	....	....	4.20
4	400	100	2°45′	.9988	99.88	399.76	.0480	4.80	N20°00′W	.9397	.3420	4.51	....	....	1.64	11.24	....	....	5.84
5	500	100	4°30′	.9969	99.69	499.45	.0785	7.85	N15°00′E	.9659	.2588	7.58	....	2.03	....	18.82	....	....	3.81
6	600	100	7°30′	.9914	99.14	598.59	.1305	13.05	N 9°30′E	.9863	.1650	12.87	....	2.15	....	31.69	....	....	1.66
7	700	100	9°45′	.9855	98.55	697.14	.1693	16.93	N19°00′E	.9455	.3256	16.01	....	5.51	....	47.70	....	3.85	....
8	800	100	13°15′	.9734	97.34	794.48	.2292	22.92	N47°00′E	.6820	.7313	15.63	....	16.76	....	63.33	....	20.61	....
9	900	100	19°15′	.9441	94.41	888.89	.3297	32.97	N53°00′E	.6018	.7986	19.84	....	26.33	....	83.17	....	46.94	....
10	1000	100	22°00′	.9272	92.72	981.61	.3746	37.46	N75°00′E	.2588	.9659	9.69	....	36.18	....	92.86	....	83.12	....
11	1100	100	24°30′	.9100	91.00	1072.61	.4147	41.47	N84°00′E	.1045	.9945	4.33	....	41.24	....	97.19	....	124.36	....
12	1200	100	26°00′	.8988	89.88	1162.49	.4384	43.84	S86°00′E	.0698	.9976	..	3.06	43.73	....	94.13	....	168.09	....

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

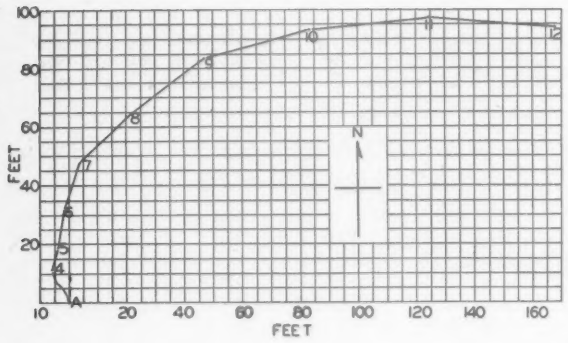


Fig. 3

1 given above, by multiplying values in column 3 by corresponding values from column 5. Column 7 represents a cumulative total of the values in column 6, and is useful in that it gives the total vertical depth below the surface of any chosen testing point.

Values in column 9 are obtained, utilizing equation 2, by multiplying values from column 3 by corresponding values from column 8. Values of latitude are calculated, from equation 3, by multiplying values from column 9 and corresponding values from column 11. It is evident that the direction of the bearing (i.e., whether the angle β is measured from north or south) determines whether the latitude is placed in column 13 or in column 14.

In accordance with equation 4, the departure of each course length is calculated by multiplying values from column 9 by corresponding values from column 12, the direction indicated in the bearing (east or west) determining whether a departure is placed in column 15 or in column 16.

The values in columns 17, 18, 19 and 20 are algebraic summations of the latitudes and departures down to any given testing point. It can be seen, then, that any given point is located vertically from the mouth of the well at the surface by the value from column 7, and is located horizontally with respect to the mouth of the well by its total latitude taken from either column 17 or column 18, and by its departure, taken from either column 19 or column 20. From these three values (vertical depth, latitude, and departure) three different graphical representations of the course of the well can be drawn. These three views are shown in Figs. 3, 4, and 5.

Fig. 3 is a map obtained by plotting on coordinate paper the "total" latitudes and departures for each successive depth, starting from the point A, representing the mouth of the well, as a reference point. Note that each testing point is numbered on the map to agree with numbering used in Table 1. This map is the view that one would obtain if it were possible to see the entire hole looking directly down upon it from a height. If the hole were absolutely vertical, only one point (Point A) on the map would represent the course of the entire hole.

Fig. 4 is a cross-section of the course of the well as projected on a north-south vertical plane. This view is obtained by plotting on coordinate paper the "total vertical depth" figures from column 7 and "total latitude" figures from columns 17 and 18. In this drawing, point A represents the mouth of the well and the various testing points are numbered to agree with Table 1.

Similarly, Fig. 5 is a cross-section of the course of the well projected on an east-west vertical plane. This view is obtained by plotting the "total vertical depths" from column 7 and "total departures" from columns 19 and 20 of Table 1. Again, A represents the well-mouth and testing points are numbered to correspond with Table 1.

In order to make it easier to visualize the course of the well bore a scale model showing all three dimensions, may be prepared. Fig. 6, prepared from the data of Table 1, is an illustration of such a view.

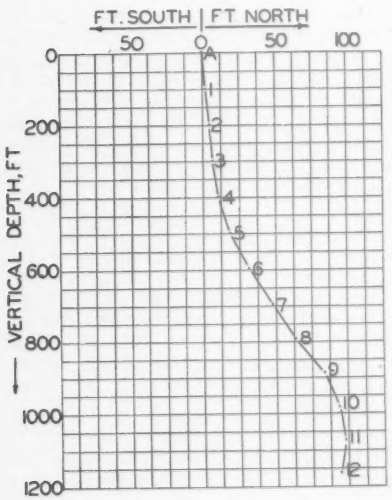


Fig. 4

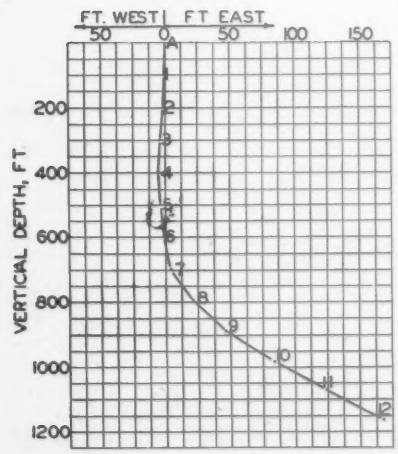


Fig. 5

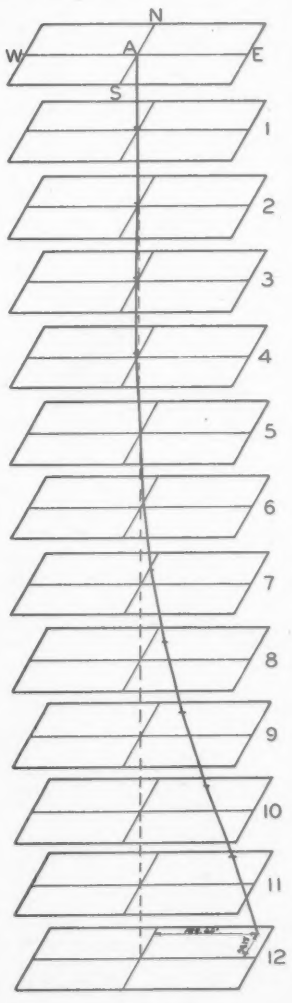
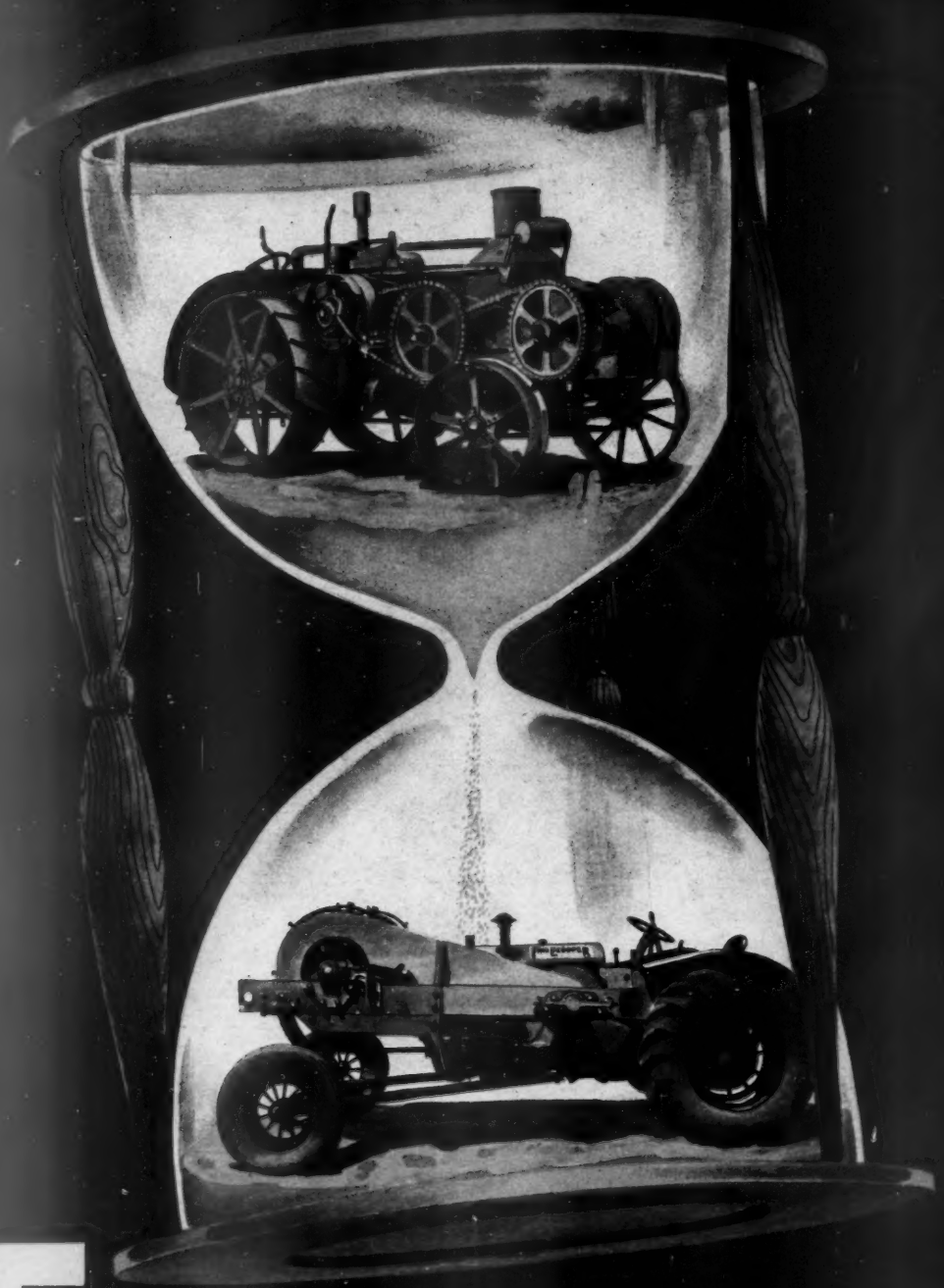


Fig. 6



25 years of service to the Production Division of the Oil Industry

1910 Celebrating opening of Cooper-Bessemer plant.

More Cooper designed and manufactured Allis-Chalmers Well Servicing Units are used in the oil fields of North America.

. . . Allis-Chalmers Units are used in many foreign fields. This winch tractor is shown pulling a well in the Far East.

. . . and these same standardized units are generally used throughout the oil fields of South America.

Twenty-five years have passed since Fred E. Cooper started to design and manufacture oil well servicing winch units for the Rumely OilPull tractor Ordinarily, the attaining of this milestone of manufacturing experience in the oil industry would be an occasion for celebrating.

But with our Country dedicating its efforts to winning a total war, neither we nor the friends who have shared with us our progress, have the time or the feeling for a celebration.

Nevertheless we do want to dedicate this 25th landmark to all the users of Cooper built Allis-Chalmers Well Servicing Units and Power Engines . . . our customers . . . the suppliers of our materials, and to those of our own organization, all of whom have given us their loyalty, co-operation, confidence and friendship.

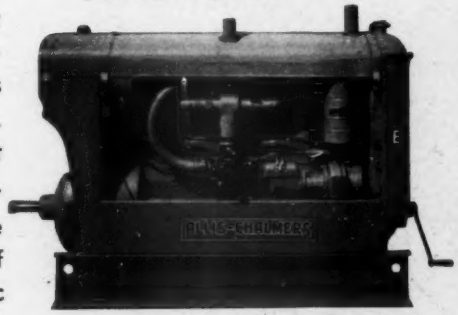
EQUIPMENT and ENGINES

The evolution of Well Servicing Units and Power Engines by Cooper has kept pace with the progress of the major developments of which this organization is a part . . . the Petroleum Industry . . . and Allis-Chalmers, one of the largest industrial organizations of this Country.

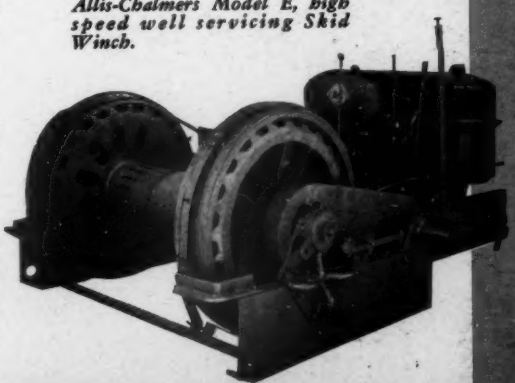
The winch tractor has made a definite contribution to Petroleum's great task of supplying vital materials to domestic industries and to the armed forces. Today the accepted method of pulling rods, tubing and servicing oil wells is the use of portable well servicing equipment, because these units are designed and engineered to service wells quickly . . . to save manpower and to eliminate unnecessary materials.

An A-C Winch Tractor will service from 20 to 100 wells in a field depending on the depth and distance between wells.

Allis-Chalmers Model E, slow speed, high torque Power Unit.



Allis-Chalmers Model E, high speed well servicing Skid Winch.



CHRONOLOGY

1918—Fred E. Cooper — Rumely Company manufacturing contract signed.

1920—First Rumely 16-30 OilPull Winch Tractor.

1931—Rumely Company merged with Allis-Chalmers Manufacturing Company.

1932—Cooper designed circulating air-cooled winch brakes for well servicing units.

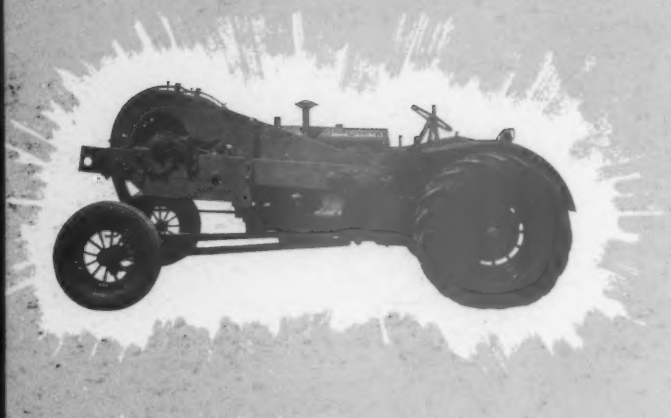
1932-33—Allis-Chalmers applies first rubber tires and develops first 60 M.P.H. tractor. First high-speed servicing unit.

1935—Cooper opens new plant at Hale Station, Tulsa. Under one roof the world's largest organization devoted exclusively to the manufacture, sales and service of oil field winch tractors, skid winches and power units.

1943—November 28th—Completes 25th Year of exclusive service to the Production Division of the Petroleum Industry.

ALLIS-CHALMERS

Well Servicing Winch Tractors and Skid Winches



WINCH TRACTORS — High Speed. FOUR sizes of single drum units and two sizes of double drum units are available. All units have Eight line speeds on the winch drums. All winch drums are equipped with Copper, patented, circulating air-cooled brakes. Units are optional with 12 m.p.h., 15 m.p.h. or 30 m.p.h. maximum road speeds. Telescoping masts, either single or double pole, are available. Rotary drive and cleaning-out equipment are also available for all winch units.

Winch Model	Line Pull
L —single drum	66,730 pounds
E — " "	58,970 "
M— " "	32,600 "
W— " "	20,666 "

SKID WINCHES—EIGHT sizes of single drum units and SEVEN sizes of double drum units are manufactured as standard models. These units are powered by the same heavy duty, slow speed tractor engines used in the tractor models. Fuel can be natural gas, butane, gasoline or distillate.

Because of the in-line mounting of the engine as an integral part of the winch unit, these skid winches are more compact, can be mounted on smaller trucks, are easier to handle and can be installed as portable or semi-permanent units. Rotary drive sprockets, spudding equipment and telescoping masts are available for these units. Line pulls are the same as shown above for the tractor models.

SPUDDERS — Allis-Chalmers, Skid or Tractor type for rotary or cable tools, two drums, cathead, rotary drive and spudding equipment. These units will drill with reasonable speed shallow and average depth wells, and service or clean out any depth well. Drums can be operated independently or in unison. Equipped with a newly designed variable stroke cross arm. Crank type spudding arm. Tool strokes of 27", 35", 43" and 55" are quickly available.

The A. C. Model L Spudder is made with TWO sizes of double drums. Maximum line pull—66,730 pounds.

The A-C Model E Spudder is made with THREE sizes of double drums in skid type and single or double drum tractor type. Maximum line pull is 58,970 pounds.

The A-C Model M Spudder, either skid or tractor type, is available with TWO sizes of double drums. Maximum line pull—32,600 pounds.

FRED E. Cooper
Hale Station, TULSA, OKLAHOMA
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BRANCH—9619 South Main St. - - - - - - Los Angeles
BRANCH—1418 Franklin St. - - - - - - - - - Houston

Twenty-Fifth Anniversary Proves Value Of Fred E. Cooper's Invention

by H. Stanley Norman

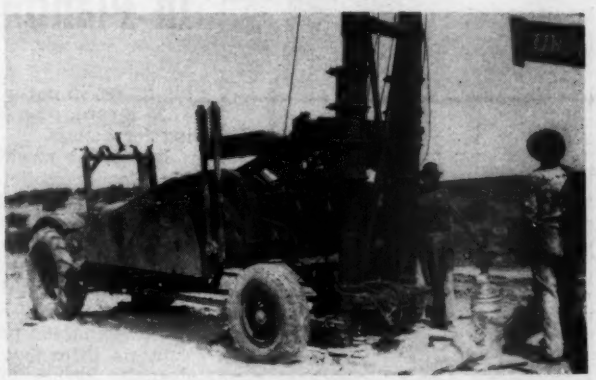
This summary of how Fred E. Cooper developed mobile well servicing units, commemorating his twenty-fifth anniversary as a manufacturer of oil-field equipment closely parallels progress of the petroleum industry. The account describes growth of his original idea for attaching a winch to a farm tractor to the modern specialized equipment.

A NEBULOUS idea, conceived and nurtured to a feeble start 25 years ago in the seemingly unrelated atmosphere of a bicycle shop, furnished the foundation for one of the modern oil industry's outstanding lines of mobile well servicing units.

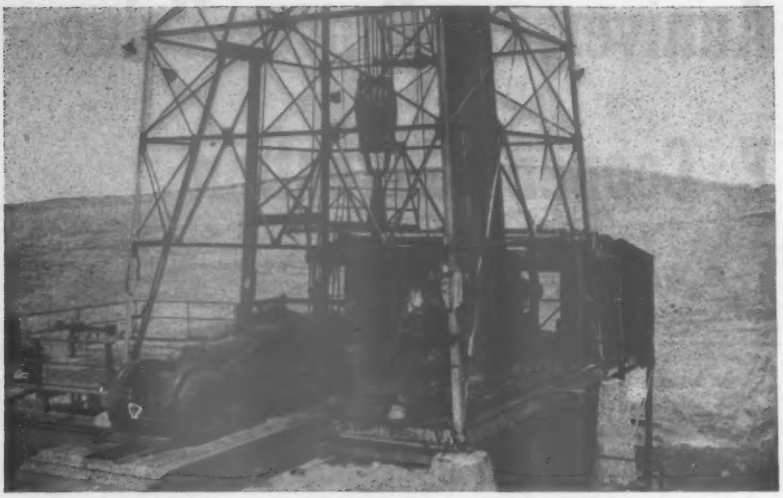
Small wonder, then, that Fred E. Cooper, Tulsa, world-wide manufacturer and distributor of Allis-Chalmers oil-field well-servicing equipment takes pride in the twenty-fifth anniversary this month in the business he founded and developed.

The motives and incentives that inspired "Uncle Fred," as Mr. Cooper is affectionately known among employes throughout his organization, to develop a winch attachment for a conventional farm tractor 25 years ago—the objective of saving time, steel and manpower—are applicable with redoubled emphasis under existing war conditions. Development of fully integrated and portable well-servicing and drilling equipment on the whole has been a gradual refinement of the original improvised machines. Still, the modern units, with their highly selective ranges of power, speed, weight, and auxiliary equipment are a far cry from the first Rumely tractor with winch attached which Fred E. Cooper demonstrated to skeptical production men in the Ponca City area a quarter of a century ago.

The outstanding feature of all portable well-servicing equipment and oil-field power units is the speed and simplicity of operation and the drastic economy in steel. A single servicing unit, experience from various parts of this country and foreign fields confirms, is capable of main-



Above: One of the double-drum, two-pole-mast units engaged on a well-servicing operation. Left: The same unit moving to location. Below: A skid-type winch unit stationed under standard derrick



The Model E double-drum winch tractor handling pipe

taining 20 to 100 wells, depending on the variable factors of spacing, terrain, well depths and required frequency of attention.

The Fred E. Cooper arrangement with Allis-Chalmers is unique in the petroleum-equipment industry. Tractors are built to Cooper specifications, including special transmissions and wheel brakes. The manufacturing operation performed by Cooper in production of well-servicing equipment and oil-field power units includes a wide range of modifications and installation of special equipment. In some combinations, little remains of the original tractor delivered to Cooper's plant, except the engine. Rubber-tired wheels are used. The narrow, conventional-tractor front axle is replaced with one that separates front wheels to the standard-highway gage. Single or dual winches for pulling and running rods, tubing, drill pipe, bailer, fishing tools and drilling bits

Founder's Interest in Machinery Helped In Planting Idea for Well-Servicing Units

FRED E. COOPER

TWENTY-FIVE years of successful operation as a manufacturer and developer of oil-field equipment will be commemorated November 28 by Fred E. Cooper. Character of the man who built the organization with his own aggressiveness and talents is best related by tracing his progress through boyhood, young manhood and in mature business operations.

He was born in Pratt Center, Kans., and in the late winter of 1892-93 his father decided to make the run on the Cherokee strip. The family moved to Hennessey, Okla., on the edge of the strip, made the run, and staked a claim in the Indian land. When he was 7 years old, Fred Cooper obtained his first job, riding herd on cattle for a neighbor at what then seemed like a munificent wage of 25 cents a day. Earlier and later he aided his father in cutting wood for sale at $1.25 a cord, planting crops and playing for dances.

Interest in machinery developed in Mr. Cooper while he was still little more than a youngster. Bicycles first claimed his attention but this interest soon turned to the faster motorcycles. He made the first cross country motorcycle ride from Wellington to Wichita, Kan. He took up motorcycle racing and participated in speed contests throughout the country and abroad. Barney Oldfield, one of the pioneer racing car drivers, is numbered among Mr. Cooper's friends.

When automobiles were introduced, Fred Cooper became the first Chevrolet distributor in Oklahoma, shipping cars into Ponca City.

The rapidly expanding petroleum industry presented an opportunity for him. He was convinced that a winch could be designed for attachment to a wheel tractor for speeding up the servicing of oil wells, one of the chief deterrents then to maximum producing operations. Consequently, he sold his automobile agency and on the same day signed a contract with the Rumely Co. to design and develop winch equipment for the concern's tractors. Shortly after negotiating the Rumely contract, the first winch tractor was introduced south of Ponca City in the old Tonkawa field. Acceptance of the revolutionary servicing equipment was not immediate because of the inherent skepticism but opportunities to demonstrate its advantages soon overcame objections.

The first skid winch for truck mounting was developed by Mr. Cooper in 1926 and 5 years later the Rumely company was merged with Allis-Chalmers Manufacturing Co. The Rumely assets, including the Cooper contract, passed to the continuing company.

The Cooper designed circulating air-cooled winch brakes for well servicing units, an outstanding feature of this particular line of equipment, was introduced in 1932. About the same time Allis-Chalmers applied first rubber tires to the tractors and developed the first 60-miles-an-hour tractor as the first high-speed servicing unit. Eight years ago, Mr. Cooper opened his existing plant at Hale Station, Tulsa, combining under one roof the world's largest organization devoted exclusively to the manufacture, sales and service of oil field winch tractors.

The years have afforded opportunities for Mr. Cooper to revert to his boyhood training in working with stock and land. He now has several Oklahoma farms, all stocked with high-quality cattle and horses.

In recent years, he has also yielded to earlier enthusiasm for speedy transportation and, when necessary, uses his own airplane for covering the world-wide fields in which his equipment is used. Before the war, he had two ships at the disposal of the organization, but one was requisitioned for military service.

Congratulations Mr. Cooper— on 25 Years of Progress

Gatke Deep-Well Woven Brake Blocks. Drilled and countersunk. Furnished in Custom-Bilt Sets for all requirements of Oil Field Equipment.

Gatke Clutch Facings are made in all sizes and types for Oil Field Service.

Gatke Bearings—moulded of resin bonded fabrics to machined accuracy in all shapes and sizes for replacing metal bearings without change in standards.

Working with you and your fine organization these many years has been most pleasant.

The improved efficiency of Oil Well Drilling and Servicing Equipment developed by you and other pioneer manufacturers are proving mighty factors in speeding Victory. The economies effected in maintaining essential production of vital petroleum with minimum man-power and materials are beyond calculation.

Today when War Production Requirements have first call on our capacity, we are glad that the essential need for oil production has made it possible to meet your requirements.

When Victory is won and we can again turn to making things that contribute to safety, efficiency and ever-increasing standards of living, you will find us ready to render the full measure of cooperation in producing materials to your requirements and maintaining the quality excellence you have learned to expect in GATKE Brake Lining and Clutch Facings.

You will also find our facilities greatly increased thru factory expansion, affording capacity to meet your needs, however great.

Thomas L. Gatke

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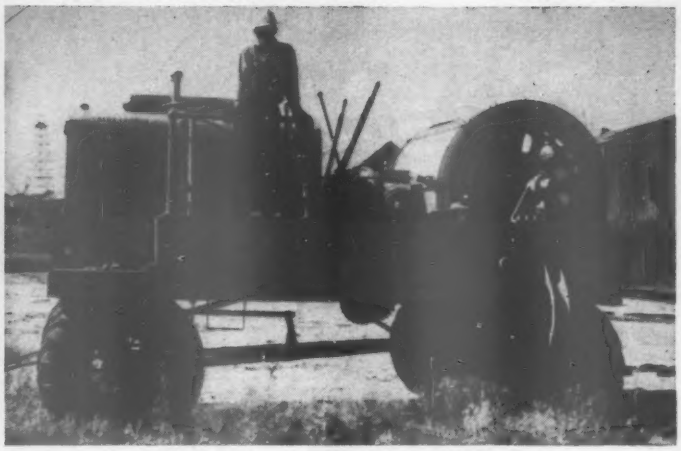

The Model W, single-drum winch tractor, left, pulling a a shallow well. The Model L winch at the right is shown pulling a pump from a 4,200-ft. well in Oklahoma

are installed at the option of the purchaser. Either telescoping single or double-pole masts are finished, equipped and installed on the service or power units at the Cooper plant.

Air-cooled brakes on the winches are a special patented feature on all units. The brake was developed by Fred E. Cooper during his early experiments and work in perfecting the adaptation of tractors to well-servicing equipment. The cooling fins are cast as an integral part of the brake drum. In all cases, irrespective of braking surface, lining is installed and furnished in 8-in. widths, or less. Lining of greater width, Cooper's engineers assert, is more likely to burn, gall and fray, leading to troublesome delays in operations and in the overall efficiency of the units. The patented fins are so arranged and constructed as to force air into the zone of contact between the drum and brake band, resulting in one of the most satisfactory cooling systems available on portable hoisting equipment.

Scope of the oil-field work which the portable and skid-mounted units are qualified to perform in field operations is infinite. Units are designed for specific ranges of service but the margin of flexibility in all models embraces functions of drilling, servicing, reconditioning, deepening and completing wells.

Tractor type well-servicing units are available in four general models

In oil field equipment, machine tools, and war plants . . . wherever production requires outstanding bearing efficiency . . . you will find McGILL bearings doing a fine job. That's why they are being used in Fred E. Cooper equipment.

McGILL "Solidend" *MULTIROL* and Cam Follower Bearings have these features:

1 — Greater Load Capacity
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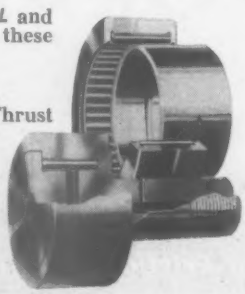

Bearing Division—1550 N. Lafayette St.

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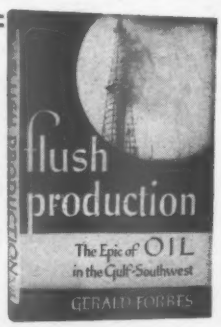
. . . . The Epic of Oil in the Gulf-Southwest

by GERALD FORBES



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A vigorous, readable history of oil in Oklahoma, Kansas, Texas, Louisiana, Arkansas, and New Mexico, where more oil has been produced than in the whole world outside of the United States $2.75

"It's recommended reading."—Claude V. Barrow, Oil Editor of *The Daily Oklahoman*.

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BOOK DEPARTMENT

The Oil and Gas Journal, Tulsa, Oklahoma

ON THE FIRST MODELS . . . and on the LATEST!

On the first Fred E. Cooper-designed OilPull Winch Tractors conceived a quarter of a century ago—and down through busy years of development and improvements, Diamond Roller Chain Drives have helped play a part in the performance for which these Winches have become noted.

Marking an outstanding event in the transition from the crude, inefficient and underpowered equipment of the era of the First World War to the efficient, specialized, rugged designs of today, these Winches started the general evolution which has resulted in the United States being the acknowledged producer of the finest oil field machinery in the world.

From the very beginning Diamond Chain engineers have cooperated closely with machinery manufacturers, gaining experience not to be duplicated anywhere. The fact that the large majority of all the roller chain used on oil country machinery is Diamond, is good evidence of performance under the severe conditions under which this machinery operates.

For original equipment—and for replacements—insure dependable performance by specifying Diamond Roller Chain Drives. . . . DIAMOND CHAIN & MFG. CO., 475 Kentucky Avenue, Indianapolis 7, Indiana. Tulsa Office: 2238 Terwilliger Blvd.

DIAMOND ROLLER CHAINS

A view of the stock room at the Cooper plant in Tulsa

but optional equipment of dual drums increases the selectivity. Furthermore, the wheel assembly is available in numerous combinations. For service in areas where seasonal mud hampers transportation of heavy equipment, the tractor-type units are available with dual balloon tires on each rear wheel and balloon tires on front,, imparting a "floating" buoyancy to the equipment which permits portability in all weather short of floods.

Maximum line pull by tractor-type servicing units range up to 66,730 lb. for the Model L which is equipped with a 6-cylinder, valve-in-head motor with 5¼-in. bore and 6½-in. stroke. Displacement of the engine is 844 cu. in. Rotary drive and spudding equipment is available for all winch units. Telescoping masts are available. The Model L has eight line speeds on the drum ranging up to 1,059 ft. per minute at 1,200 r.p.m. on the engine. The most recent designed spudder attachment is of the variable stroke, crank type. The crank is equipped with four pin holes, giving tool strokes of 27, 35, 43 and 55 in. The masts for all Cooper units are built with deep groove sheaves made of manganese-alloy steel, 23 in. in diameter. Sheaves are ball-bearing mounted on a 2¾-in. alloy-steel shaft. The engine has a continuous operating range of 600 to 1,200 r.p.m. Torque is 500 ft. lb. at 650 r.p.m. Engines operate either on gasoline, butane, natural gas or distillate.

The "pony" unit of the Allis-Chalmers and Cooper line of tractor-type servicing units is the Model W which resembles its larger companions, except that the engine, winch, weight and other characteristics are scaled down in order to provide a compact streamlined unit built to handle up to 3,500 ft. of 2-in. tubing, or other well-servicing assignments involving weights within limits of the maximum line pull of 20,666 lb.

The Model L drilling unit is the heaviest machine in the Allis-Chalmers and Cooper line. It is available as a winch tractor or as a skid winch unit for servicing the deepest wells. The transmission in this unit is built especially to withstand the heavy shocks in the deeper services to which

CONDENSED SPECIFICATIONS—WINCH TRACTORS—SINGLE DRUM

MODEL	L	E	M	W
Maximum line pull	66,730 lb.	58,970 lb.	33,600 lb.	20,666 lb.
Line capacity, ½"	32,020 ft.	9,740 ft.	8,200 ft.	5,660 ft.
Engine	6 cyl., valve-in-head	4 cyl., valve-in-head	4 cyl., valve-in-head	4 cyl., valve-in-head
Cubic inch displacement	844	563	318	201
Bore and stroke	5¼" by 6½"	5¼" by 6½"	4½" by 5"	4" by 4"
Number main bearings	4	3	3	3
Governor	Full throttling	Full throttling	Full throttling	Full throttling
Transmission	4 spds. fwd., 1 reverse	4 spds. fwd., 1 reverse	4 spds. fwd., 1 reverse	4 spds. fwd., 1 reverse
Lubrication	Force feed	Force feed	Force feed	Force feed
Water pump cap., 1 ft. head normal r.p.m.	108 gal. p.m.	71 gal. p.m.	48 gal. p.m.	23.9 gal. p.m.

Good Boy, Fred!

TWENTY-FIVE years of growth and progress is something to talk about. Congratulations! May the name Fred E. Cooper continue to stand for dependable equipment and efficient service for many years to come.

Servicing of
BRIGGS and STRATTON
GASOLINE MOTORS

AUTHORIZED SERVICE
Briggs & Stratton

Original parts.
Factory made tools.
Trained Mechanics
Right prices.

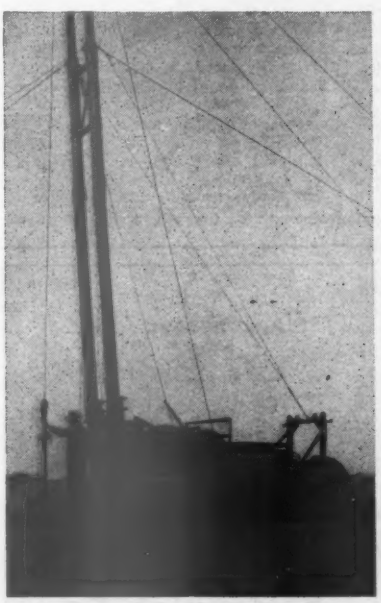
CHALMERS ELECTRIC SERVICE CO.
225 East 10th Street • Tulsa, Oklahoma
SAM JIMMIE

it is customarily assigned, and for the more severe conditions encountered both in rotary and cable-tool drilling. The transmission is not the conventional automotive type. On the contrary, the heavy-duty gears are manufactured in the Cooper plant from alloy steel and are subjected to run-in tests which assure as far as possible trouble-free operation in the field. The unit is powered with a slow-speed 6-cylinder power unit which has a bore of 5¼ in. and a stroke of 6½ in., a piston displacement of 844 cu. in.

When designed specifically for rotary or cable-tool drilling the Model L unit is equipped with two drums, cathead, rotary drive and spudding equipment.

Tractor-type equipment customarily is furnished with supports for cradling the mast across the longitudinal axis of the unit. Clamps hold the mast, whether it be the telescoping single or double-pole type, to the supporting members which extend above the maximum height of the winch drum and other mechanism. The forward support of the mast cradle serves as a fulcrum over which the mast is hoisted into an upright position. Hoisting lines are attached to the base of the mast and are taken up by the regular winch which is an integral part of the machine. The masts are available in extended heights of 40 to 60 ft., depending on the size of the unit and the work it is expected to perform. However, height of the mast is largely optional with the operating company because they are finished from rough fabrications to the specifications of the consumer.

Manufacture and distribution of



Working on a flowing well which has not been equipped with production derrick

The growth of the Fred E. Cooper organization since 1918 presents another of America's outstanding examples of industrial development. ENSIGN congratulates Fred E. Cooper on 25 years of service.

ENSIGN Carburetion Equipment is used on many of the engines which furnish power for Fred E. Cooper units.

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CARBURETOR CO., LTD.
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Prepare NOW for post-war demands. Our competent engineering staff is at your service.

Bringing War Plant Experience To Oil Industry Construction!

If we've been unable to take care of your requirements during the past two years, it's because our personnel and plant facilities have been doing everything we possibly could to aid America's war effort. This work has both broadened our experience and increased our facilities to now better serve the oil industry, which, next to Uncle Sam, always has first call on our services.

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- Douglas Aircraft Plants Tulsa, Oklahoma City
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- Parts Assembly Bldg. Ft. Worth, Texas
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PATTERSON STEEL COMPANY
TULSA, OKLAHOMA

A Salute To

FRED E. COOPER, an outstanding industrialist and humanitarian, upon the completion of his twenty-five years in business. We join the many organizations and individuals whom he has served, in wishing him continued success in his every undertaking.

•

Kahan
PIPE & SUPPLY CO.
TULSA, OKLAHOMA

A skid winch with gas fuel system handling tubing at a distance from the well head

well-servicing and oil-field power units are only two of the three functions performed for the petroleum industry by the Fred E. Cooper organization. The third function, and one which testmonials indicate is most valuable in field operations, is the servicing of units. All engine and equipment parts are standardized to a degree uncommon in the petroleum or any other industry. Many parts for the various-sized units are interchangeable, giving operators in the field maximum protection against enforced idleness of equipment regardless of the degree of essentiality of work in which the units may be engaged. A complete stock of repair parts and service is maintained at the Cooper plant and distribution centers. Overnight service on repair parts is one of the features on which the organization has been built.

The Tulsa plant is organized on an assembly-line basis. A new order for a specific model of well-servicing or power unit goes to the stockroom where every part required for the

MASTS

	LIGHT	STANDARD	HEAVY
Types	Telescoping Single pole Two pole	Telescoping Single pole Two pole	Telescoping Single pole Two pole
Available lengths	40′ to 50′	45′ to 60′	45′ to 60′
Lower section	7″ o.d. by 25 lb. Seamless casing 4 guy lines	8⅝″ o.d. by 32 lb. Seamless casing 4 guy lines	10¾″ o.d. by 55 lb. Seamless casing 4 guy lines
Upper section	5½″ o.d. by 20 lb. Seamless casing 4 guy lines	7″ o.d. by 25 lb. Seamless casing 4 guy lines	9″ o.d. by 45 lb. Seamless casing 4 guy lines
Cap. in lb. at 45′, height—safety factor 2	Single pole—17,000 Two pole—37,770	Single pole—40,800 Two pole—90,660	Single pole—96,700 Two pole—214,880
Sheaves	1 or 3 for ¾″ or ⅞″ line 23″ diameter	1 or 3 for ¾″ or ⅞″ line 23″ diameter	1 or 3 for ¾″ or ⅞″ line 23″ diameter

Note—Capacities are calculated on the collapsing strength of the pipe properly guyed.

Congratulations
FRED E. COOPER
On Your
Twenty-Fifth Anniversary

•

May the years ahead continue to bring you well-deserved recognition as a leader in the manufacturing and distributing of well servicing equipment.

•

Standard Parts Co.
818 S. Detroit
Tulsa, Oklahoma

Congratulations Mr. Cooper

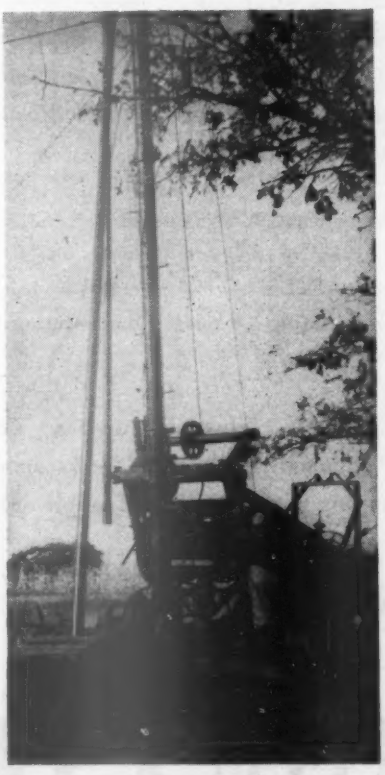
We are proud to have furnished the paint for finishing your mobile well-servicing units.

Cook Paint & Varnish Co.

CONDENSED SPECIFICATIONS—SKID WINCHES

	MODEL "L"		MODEL "E"		MODEL "M"		MODEL "W"
	Single drum	Rear drum	Single drum	Rear drum	Single drum	Rear drum	Single drum
Maximum line pull	66,730 lb.		58,970 lb.		32,600 lb.		20,666 lb.
Drum capacities—line	52" by 44" 32,020' of ½"	42" by 44" 20,610' of ½"	42" by 44" 20,610' of ½"	34" by 44" 12,740' of ½"	34" by 48" 13,900' of ½"	34" by 44" 12,740' of ½"	26" by 33" 5,660' of ½"
Drum capacities—line	42" by 44" 20,610' of ½"	34" by 44" 12,740' of ½"	34" by 48" 13,900' of ½"	34" by 44" 12,740' of ½"	34" by 36" 10,460' of ½"	32" by 32" 8,200' of ½"	
Drum capacities—line			34" by 36" 10,460' of ½"	32" by 32" 8,200' of ½"			
Engine	6 cylinder Valve-in-head		4 cylinder Valve-in-head		4 cylinder Valve-in-head		4 cylinder Vlv.-in-head
Bore by stroke	5¼" by 6½"		5¼" by 6½"		4½" by 5"		4" by 4"
Governor	Full throttling		Full throttling		Full throttling		Full throt'ing
Water pump capacity 1 ft. head normal r.p.m.	108 gal. p.m.		71 gal. p.m.		48 gal. p.m.		23.9 gal. p.m.

manufacturing operation, down to the smallest key, is collected by the storekeeper and transferred as a unit to the shop. Special equipment to meet the specifications of the particular users of the unit to be built is made in the shop. Brakes are turned out on precision lathes and ground to a mirror polish. The brake drums are weighed on a wheel-spinning machine and counterbalanced to avoid vibration and uneven wear on the brake lining and band. Sprockets and special gears are machined in the Cooper shop. Power shafts are installed, control levers mounted and connected, road gears adjusted and other steps taken in the manufacturing operation.



A double-drum unit with spudder attachment in service as a drilling rig

"TUF-WEAR" ELECTRIC STEEL CASTINGS

ARE USED IN

FRED E. COOPER Oil Well Servicing Units

Tough, strong, castings made by the Oklahoma Steel Castings Company have been used for many years in Fred E. Cooper units.

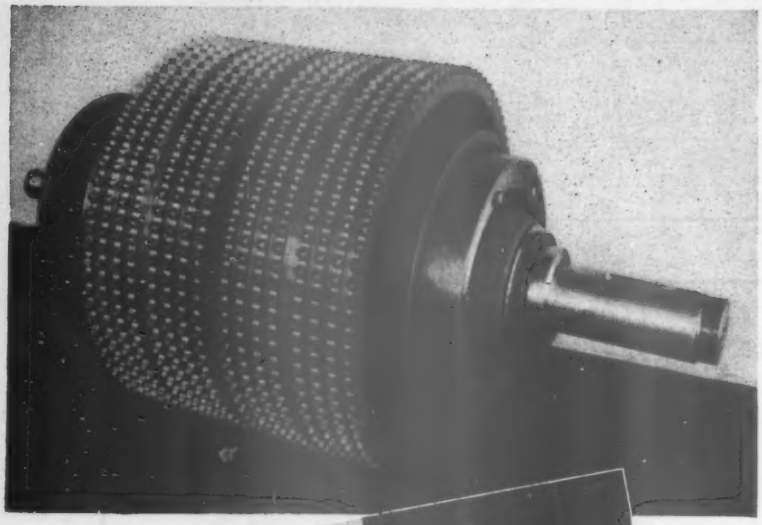
This is just another of the many reasons why Fred E. Cooper Servicing Units give satisfactory service.

"E" AWARD TO OKLAHOMA STEEL CASTINGS COMPANY

From one of the finest equipped, modern foundries in the country come "Tuf-Wear" electric steel castings. In recognition of these strong castings of uniform quality built for our military machines . . . the "E" award was given to the Oklahoma Steel Castings Company.

OKLAHOMA STEEL CASTINGS CO.
TULSA, OKLA.

There's a UNIT RIG for every drilling job!



TOP: Marine Drive Propeller Shaft Equipped with AIR-O-MATIC Clutches. BOTTOM: Mud Pump Drive On Draw Works With AIR-O-MATIC Clutch Controlled From Driller's Position.

From Oil Fields to Ocean Highways

Powerful and dependable, AIR-O-MATIC Clutches—designed and built to stand strenuous oil field uses—are now playing an important part in essential marine service equipment. Here are the features that have been approved by oil field and marine engineers:

Only one actuating part • Air Cooled (self-induced) • Equalized Pressure on All Driving Parts • Torque Controlled-Definitely Important for Rotary Drive • Self Cleaning • Self Compensating for wear of friction elements.

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Buy MORE WAR BONDS!

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AIR-O-MATIC Clutches are powerful, flexible, safe and durable. They operate with "finger tip" control. The engagement is cushioned thereby eliminating shock and loss of time in bringing clutch into full application.

Safe as a Locomotive Air Brake!

- SPITFIRE
- MOTORIG
- MOTOHOIST

} *all are equipped with* AIR-O-MATIC CLUTCHES

UNIT RIG & EQUIPMENT CO.
TULSA OKLAHOMA U.S.A.

REFINING

Shell's New Catalytic Cracking Plant Dedicated

LOS ANGELES, Calif.—Shell Oil Co., Inc.'s new catalytic cracking plant near Wilmington, Calif., was put into full operation November 13.

The plant, first of its type to be started and completed in America since Pearl Harbor, becomes one of the nation's major producers of 100-octane gasoline. Alone, it will produce enough of this vitally needed war fuel each day to fly 250 bombers over Berlin.

The new Shell plant is part of a 20-million dollar project, covering more than 30 acres. Towering 240 ft., the cracking unit was completed in record time by a crew of 1,000 men.

Port Neches Butadiene Plant to Start Production

PHILADELPHIA, Pa. — Plans for the opening of the world's largest butadiene plant, capable of producing the raw material for one-seventh of the United Nations' wartime supply of synthetic rubber, are nearing completion.

The plant, which is located at Port Neches, Tex., is government owned,

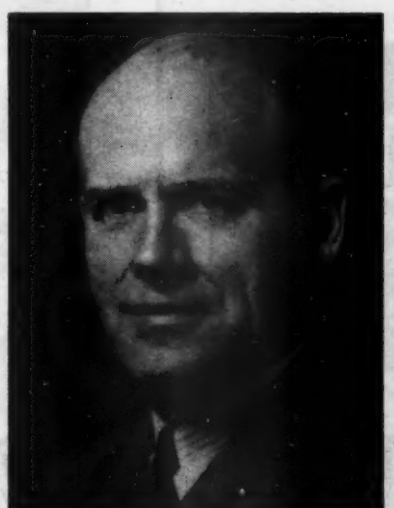
Sketches of Plant Operators

DOUGLAS L. HOOKER has been appointed a member of the manufacturing committee of Socony-Vacuum Oil Co., Inc. Mr. Hooker was serving as manager of the Paulsboro, N. J., refinery of Socony-Vacuum, when he was moved up to replace John Stanley McElfresh, who died in August. Among his responsibilities will be supervision of eastern refining operations and, at the war's conclusion, foreign refining operations.

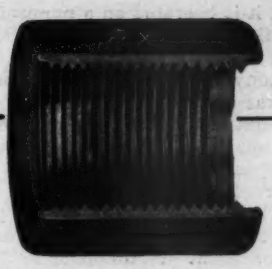
Mr. Hooker was born at Olean, N. Y., in 1895. Educated at local schools and at Lawrenceville Preparatory School. He was in his second year at Cornell University when he enlisted in the U. S. Navy in 1917. After 26 months of service on destroyers and cruisers he returned to Cornell and he graduated with a degree in mechanical engineering in 1921. He served Standard Oil Co. of California as a process engineer until 1929 when he joined the Vacuum Oil Co. as an engineering specialist. He spent 1 year at Olean and was then transferred to the Paulsboro refinery. He was named assistant superintendent there in 1931 and 3 years later was promoted to superintendent. On the retirement of C. J. Hamm in 1937 he assumed managerial responsibilities at the Paulsboro plant.

Mr. Hooker's father, George W. Hooker, now 80 years old, is a well-known former petroleum official. He retired in 1923 after 40 years of service with the old Vacuum Oil Co. He was the first superintendent of the Olean refinery when Vacuum took over that operation about 1891.

Mr. Hooker is married and has two children, Edwin, 18 years old, and Georgiana, 15. Edwin graduated this year from Blair Academy, Blairstown, N. J., and probably will join the Navy soon. Mr. Hooker's hobbies are golf and boating; he owns a diesel-powered cruiser which, under ordinary circumstances, he sails out of Chesapeake Bay. The Hooker home has been at Woodbury, New Jersey, not far from the Paulsboro refinery. The family expects to settle in New York, now that Mr. Hooker has moved into headquarters at 26 Broadway.



DOUGLAS L. HOOKER



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but it is operated on a nonprofit basis by five oil companies—Atlantic Refining Co., Gulf Oil Corp., Pure Oil Co., Socony-Vacuum Oil Co., Inc., and Texas Co.

First of the two units will be placed in operation in mid-December, and the second will be ready shortly thereafter.

Through a radically new process, developed by oil-company engineers, the amount of butadiene to be manufactured from a barrel of oil will be more than doubled, and the refinery gases remaining can be used in the production of high-octane gasoline and other products.

Capacity of the plant is placed at 100,000 tons of butadiene a year, sufficient to produce more than 110,000 tons of synthetic rubber. The nation's synthetic-rubber goal is currently 800,000 tons annually.

Forty Aviation-Gasoline Plants Using 44,000 Workers

WASHINGTON, D. C.—The greatest number of skilled construction workers ever employed in petroleum refinery construction, reaching a peak of 44,000, are completing the forty 100-octane aviation-gasoline plants now being built to bring capacity up to the levels needed to fuel the expanding Allied air forces.

The peak employment of 44,000 construction workers which will be required to complete the 40 refinery units, compares with the total of about 80,000 workers who are manning the more than 500 actively operating refineries.

Limited Partnership Buys Control of National Refining

CLEVELAND, Ohio.—Control of National Refining Co. has been acquired by a limited partnership for approximately $9,000,000, according to an announcement here by Otis & Co., investment bankers. Ninety per cent of National's prior preferred stock was acquired at $100 a share and a like amount of common stock at $8 a share.

General partners in the purchasing organization are Albert A. List, president of List Finance Corp., Fall River, Mass.; Cyrus P. Eaton, Cleveland financier and industrialist; Chester Canning, president of Pacific Gas Corp., New York, and president of Petroleum Transportation Co., and William R. Daley, president of Otis & Co.

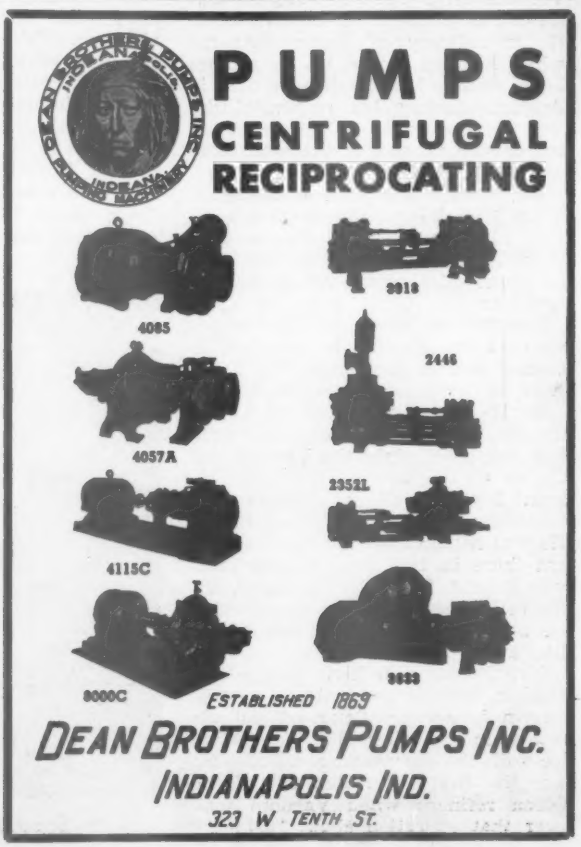
New directors will be these partners, Benjamin Woeste, vice president and general manager of Otis Terminal Warehouse Co., Cleveland, and L. G. Smith, secretary-treasurer of Otis & Co.

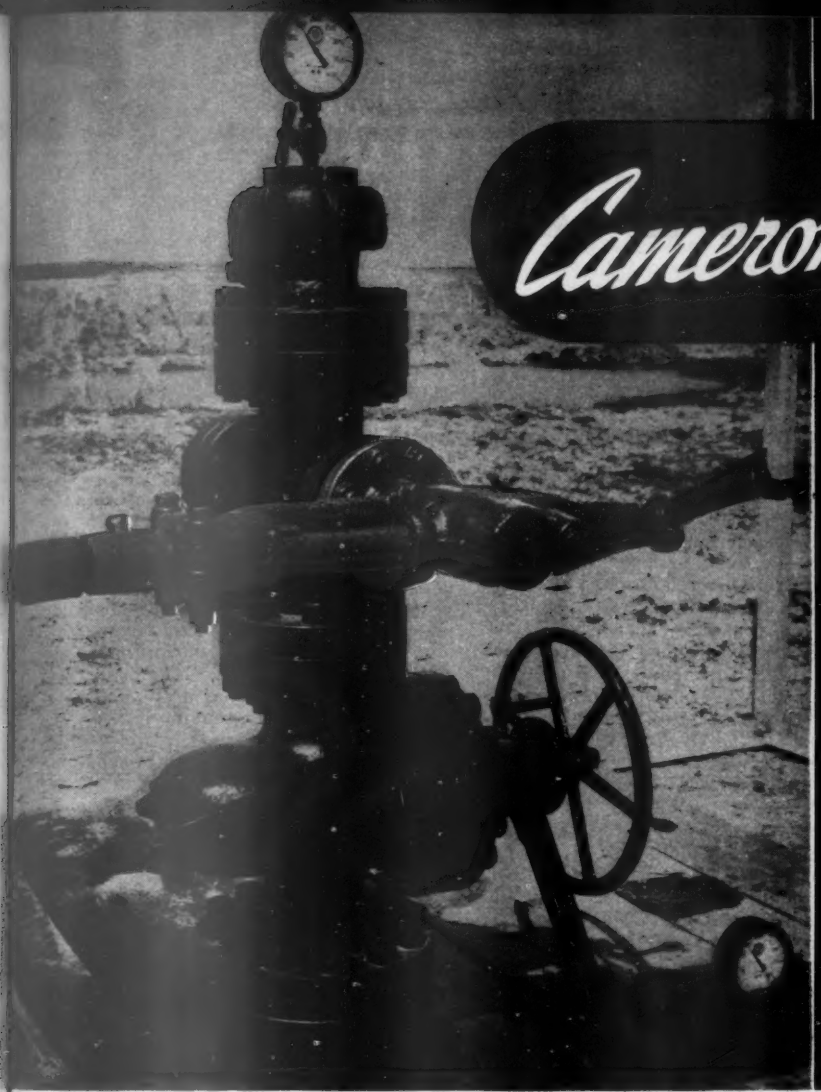
Mr. List will become vice president and assistant treasurer and Mr. Canning vice president of National Refining Co. W. H. Lamprecht, II, K. R. Proctor and L. S. Peirce will remain as directors and will serve as chairman, president, and vice president and secretary, respectively, of the company.

Refiners Insist Freight-Rate Adjustment for Crude Vital

CHICAGO. — Reports from Washington that no compensatory freight-rate adjustment is needed in moving West Texas crude to the Middle West by tank car to relieve the shortage of crude for refineries in this area were sharply challenged this week by middle western refiners, who declare such adjustment is vital.

Efforts have been made for months in governmental and industrial quarters to bring about a substantial movement of crude from shut-in areas of West Texas. One of the requirements generally regarded as necessary is the setting up of a transportation arrangement to make rail movement economically possible. This compensatory plan currently is before the Defense Supplies Corp. in Washington.





Cameron Flow Wings

MAKE YOUR TREES

Lighter
Stronger
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Economical

Note the absence of conventional wing valves in this Cameron 5,000 lb. test Safety Xmas Tree installed in the Stowell Field, Jefferson County, Texas.

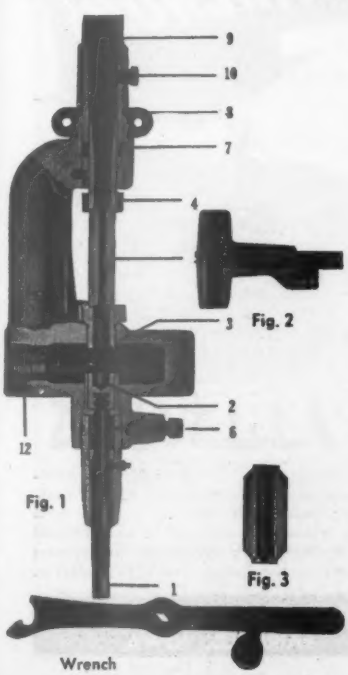

Fig. 1

Fig. 2

Fig. 3

CROSS-SECTION VIEW OF A CAMERON TYPE "D" FLOW WING

LIGHTER because the unique design of the Flow Wing combines all essential wing fittings in a single compact unit. Unlike conventional assembled wings, there are no heavy flanged connections between component parts of the flow wing, no choke nipples or choke housings, and the valve section of the unit obviates the need for conventional valves in the flow wing.

STRONGER because the Cameron Flow Wing is a one-piece steel casting whereas conventional wings consist of several fittings assembled with flanged or screwed connections.

MORE ECONOMICAL because it obviates the need for a conventional valve in the flow wing (eliminates two valves in double wing trees).

EASY TO OPERATE

Referring to Figure 1 at left, to change flow bean fit hexagon socket in wrench to valve stem (1) and close valve (2) against seat (3). Spanner part of wrench is then applied to clamp screw (4), and only two turns required to release flow bean (5). New bean is clamped in place by clamp screw and valve is then opened and well is back on production. Both valve stem and valve seat are faced with hard metal to resist cutting. Valve stem and bonnet are packed with plastic packing which may be replenished under pressure. Clamp screw is packed with an asbestos ring (7) which is tightened automatically as flow bean is clamped in place. Two-bolt union (8) obviates need for additional union in flow line. Note that downstream end of clamp screw is belled to reduce turbulence and cutting. Three types of flow beans are interchangeable: (1) "Proration" bean illustrated in flow wing; (2) adjustable flow bean, Figure 2; and (3) "production" type bean which consists of a body and renewable stellite orifice disc, Figure 3. All flow beans clamp in position as shown in Figure 1.

Cameron Flow Wings are offered in several screwed and flanged styles, ranging up to 10,000 lb. test. Like any standard fitting or valve, they may be incorporated in any manufacturer's Xmas tree.

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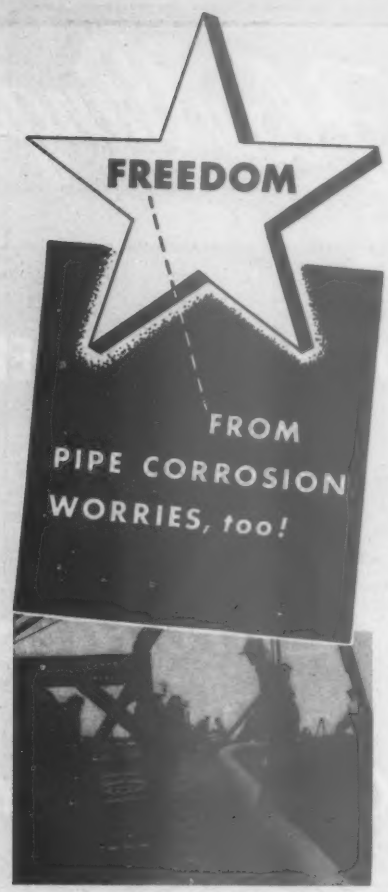

Never before has it been more important to protect pipe lines than today. And more and more pipe users have discovered a practical way to insure freedom from pipe corrosion worries by turning the job over to Pipe Line Service Corporation.

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PIPE LINES

WEP Eastern Extension Operated at Capacity

Operation of the Norris City, Ill.-Phoenixville, Pa., eastern extension of War Emergency Pipelines, Inc., 24-in. crude-oil line attained capacity last week. In a 24-hour period, 301,500 bbl. were delivered through this part of the system. The necessity for utilizing empty tank cars, which have come to Norris City in accordance with previous schedules, has prevented the eastern extension from operating steadily at full capacity. Shipments to Ohio Oil Co. at Enfield, Ill., were discontinued November 19 but they may be resumed on a small scale in December for delivery at loading racks on that system into tank cars for eastern destinations.

For the first 3 weeks of November, WEP deliveries at Norris City, Ill., averaged about 305,000 bbl. daily. A peak delivery from the system was achieved one day this month amounting to 381,445 bbl., consisting of 32,096 bbl. loaded in tank cars at Norris City, 17,276 bbl., diverted to Enfield connections, and 332,073 bbl., partly from storage, to Philadelphia and New York refineries. In this period the largest shipment in 1 day from Longview, Tex., was 321,470 bbl.

Less than 25 miles remains to be laid for the WEP 20-in. products line, which will be completed early in December. Now that the 20-in. line is filled with water as far as Norris City, pressure tests are under way on the western leg. Stations at Beaumont, Tex., El Dorado and Egypt, Ark., are now in operation. As soon as the stations at Many, La., Little Rock, Ark., and Oran, Mo., are ready to pump it will be possible to move a volume of 150,000 bbl. daily which will insure sufficient velocity for practicable shipping of heating oil.

Significance of Yale Line Is Discussed by Ickes

WASHINGTON, D. C.—Harold L. Ickes last week explained what would be accomplished by the proposed Yale Pipe Line Co. project in a recent letter to Sen. James E. Murray, in which he discussed the matter as follows:

"Although the present rate of production from the Elk Basin field is approximately 14,000 bbl. a day, it is anticipated that this will increase to 40,000 bbl. a day in 1944. The construction of the proposed pipe line from Elk Basin to Laurel and Billings, together with the construction of a second line from Elk Basin to Casper, which also has been approved by this office, will provide efficient and dependable outlets for the field. Tank trucks could not be considered an adequate means for moving this volume of daily production during normal times, and in view of the present and almost certain to be continuing critical shortage of tires and replacement parts, it would be unthinkable to jeopardize the availability of this volume of crude oil by delaying the construction of adequate transportation facilities.

"The operators of the independent refineries in Laurel and Billings have shown that their present full requirement of crude oil is not being met due to the failure of tank trucks to maintain uninterrupted deliveries. Upon the completion of the pipe line

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under discussion, these refineries will be able to maintain full capacity operations. In addition, a demand exists for crude oil from the Elk Basin field to the refineries in Idaho and Washington and also to the east as far as Chicago. Since Laurel constitutes a transshipment point on three trunk-line railroads, a saving in tank-car turnaround time of 2 days per car is realized by making rail shipment from the terminus of the proposed pipe line at Laurel rather than by tank car from Frannie, Wyo., which otherwise would be the nearest originating point for the tank-car movement."

Maguire Gets Control of Simrall Corp. System

MOUNT PLEASANT, Mich.—C. L. Maguire interests have acquired 100 per cent control of Simrall Corp., operating Michigan's largest crude-oil gathering system. The transaction, by which the Maguire interests bought out Standard Oil Co. of Ohio represents more than $500,000 in a cash deal and settles a point in the legal battle between Standard and Maguire.

The Maguires had been granted an injunction restraining Standard from building and operating a separate gathering system in the Rose Lake area of Osceola County, Michigan. That injunction now will be dissolved. Simrall Corp. operates more than 350 miles of pipe line in the Central and eastern Michigan section. Oil men had been watching the case because it tested the Michigan law restraining a partner from engaging in competition against his own firm.

Pipe Arrives for Stanolind 16-in. Line

A substantial amount of pipe has arrived for the laying of Stanolind Pipe Line Co.'s 16-in. crude-oil line from Slaughter, Tex., to Drumright, Okla. Three crews are in the field for the project, of which two are main-line gangs while the other is a river-crossing gang.

Start of Tennessee Line To Be Celebrated Dec. 4

Construction of the Texas-West Virginia pipe line of Tennessee Gas & Transmission Co. will commence with a ceremony, during which ground will be broken. This will occur at noon, December 4 at a location on the banks of the Cumberland River about 25 miles north of Nashville, Tenn.

Eastern Pipe Line Shipments Decline

Deliveries of crude oil through pipe lines in the eastern area of the country in October continued to show reductions from 1942. The decline in October was larger proportionately than in some of the earlier months.

For the eight eastern pipe lines formerly in the Standard Oil group, deliveries in October aggregated 27,656,000 bbl. against 27,904,000 bbl. in September, and 29,578,000 bbl. in October 1942, indicating a decrease of 6.5 per cent from the previous year.

A total of 279,805,000 bbl. was moved through these lines in the first 10 months of 1943, compared with 283,949,000 bbl. in the corresponding 1942 period. All lines but two continued to show gains in the 10 months.

Deliveries of crude through the eight lines in October and for the first 10 months compared with similar periods in 1942 follow in thousands of barrels:

	October		10 months	
	1943	1942	1943	1942
Buckeye	11,858	*13,715	118,269	*130,196
Eureka	1,057	1,007	10,648	9,983
Natl. Transit	1,790	1,748	18,462	17,161
N. Y. Transit	988	1,080	10,809	10,244
Northern ...	1,685	1,437	17,434	14,352
Ohio Oil	7,975	8,548	81,455	81,544
Southern	924	797	9,011	7,815
S. W. Penna.	1,399	1,246	13,717	12,652
Total	27,656	29,578	279,805	283,949
Daily avg..	892	953	920	934

*Includes Indiana Pipe Line Co.

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McCord "Clearsite" plastic sight feeds provide a new degree of visibility and clearness, supplying positive proof of oil delivery. Due to its design this sight feed may be used as an independent sight at point of lubrication. As an accessory it can be added to any lubrication system. Specify "Clearsite."

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HOW TO BRING YOUR LIST OF REFINERY AND NATURAL-GASOLINE PLANT PERSONNEL UP-TO-DATE

The Oil and Gas Journal's new Survey of Refineries and Natural-Gasoline Plants—just off the press—will give you the names and addresses of hundreds of NEW executives (from presidents down to foremen) in this field. In addition there are complete lists (by states) of both the active and shut-down plants, showing their input and output capacities, type of products manufactured. It's a buy at

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Natural Gas

Gas Association Announces Job-Classification Manual

The Southwest Personnel Conference of the American Gas Association has published a manual of Natural Gas Distribution Job Classifications covering the functions, responsibilities, minimum training and experience required for replacements under wartime emergency and the physical requirements for 118 job classifications found in all departments of natural-gas distribution operations. It is for use in connection with manning tables, replacement schedules, selective-service requirements and any other use to which a job-classification manual can be put. It was compiled by a committee headed by Oakah L. Jones, assistant secretary-treasurer of Oklahoma Natural Gas Co., Tulsa. The books are available from A.G.A. headquarters, 420 Lexington Avenue, New York 17, N. Y., at a charge of $1 to cover the printing cost.

Daily Average Production in September Sets New High

WASHINGTON, D. C.—New or expanded output of large cycling plants in Louisiana, Texas Gulf and other parts of Texas helped to raise the daily average production of natural gasoline and allied products to a new high in September, according to the U. S. Bureau of Mines. Marked gains also were recorded in the Appalachian and Panhandle areas.

The daily average for the United States in September was 250,000 bbl., compared with 239,000 bbl. in August. For the first 9 months of the year the daily average was 238,000 bbl., compared with 225,000 bbl. in the corresponding period of 1942.

Demand at refineries in September totaled 162,330,000 gal., against 154,056,000 gal. in August, and 161,868,000 gal. in September 1942.

Total demand for natural gasoline and related products in September was 344,568,000 gal., against 338,604,000 gal. in August, and 331,884,000 gal. in September 1942.

Refinery demand for cycle condensate in September was 31,584,000 gal., against 33,264,000 gal. in August and 24,948,000 gal. in September 1942, while demand for liquefied petroleum gases and benzol was 41,832,000, 43,386,000, and 27,720,000 gal., respectively.

Movement of natural gasoline and cycle condensate to jobbers and retail outlets totaled 23,478,000 gal. in September, against 20,706,000 gal. in August, and 33,138,000 gal. in September 1942.

SEPTEMBER PRODUCTION
(Thousands of gallons)

	Sept.	Aug.
Natural gasoline	176,190	183,036
Cycle products	59,136	54,726
Liquefied petroleum gases:		
Isobutane*	15,120	13,608
Other L.P.G.*	64,638	59,472
Liquefied refinery gas	13,944	13,692
Benzol	8,400	8,400
Total production	337,428	332,934

*At natural-gasoline and cycle plants.

Automatic Controls Reduce Volume of Paper Work

WASHINGTON, D. C.—The Office of War Utilities has reduced further its volume of paper work by setting up automatic controls for delivery of natural gas to small industrial users who formerly had to make application for service on appeals. The new procedure, set forth in Administrative Letter 3 under Order U-7, permits utilities to deliver natural gas to small users provided conditions set forth in the letter are met. Only small commercial and industrial consumers are affected.

South Texas Producers Ask Outlet in New Gas Line

SAN ANTONIO, Tex.—United request that the gas from six fields immediately south of Alice, in Jim Wells County, Texas, be given an outlet in the Tennessee Gas & Transmission Co.'s projected line from Corpus Christi, Tex., to Charleston, W. Va., was made by 25 operators in these fields, meeting here last week. It is estimated that the fields have reserves of more than 400 billion cubic feet of gas, and figures were produced to show that 30,000,000 cu. ft. of gas could be supplied daily from them for more than a quarter of a century besides saving oil and gasoline taken from the gas, recovery of which is impossible unless the gas is utilized.

Earl Calloway, Tom Graham and others said there is some opposition to the line based on fear that South Texas will run out of gas. They pointed out that the reserves from this and other fields of South Texas are such that not in generations will the supply be exhausted. On the other hand, about 1,000,000,000 cu. ft. is lost yearly from these six fields because of the production not being used.

Availability of Gas in Texas May Be Subject of Survey

AUSTIN, Tex.—Beauford Jester, chairman of the state Railroad Commission, announced that he would submit for consideration of the commission a proposal to hold a series of hearings to ascertain the availability of natural gas in Texas. The information obtained would be used as a guide in determining the state's capacity to produce natural gas in relation to war and domestic needs.

This plan grows out of interest in gas as a state resource aroused by the pending proposal for a Corpus Christi-West Virginia pipe line to carry natural gas out of the state, vigorously opposed by Gov. Coke Stevenson, Chairman Jester and other state officials.

Nelson L. Smith Becomes Member of Power Board

WASHINGTON, D. C.—Nelson Lee Smith recently took oath of office here as a member of the Federal Power Commission for a term expiring June 22, 1945, and at the same time the commission announced the appointment of Harry S. Littman as assistant general counsel in charge of matters under the Natural Gas Act.

Dr. Smith, who lives in Hopkinton, N. H., succeeds the late Clyde L. Peavey. He has served in various state and federal public posts since 1929. He was president of the National Association of Railroad and Utilities Commissioners in 1938 and 1939, and chairman of the New Hampshire Public Service Commission from 1934 to 1941, when he came to Washington as chairman of the Board of Investigation and Research.

Harry S. Littman has been on the commission's staff since 1938, and was principal attorney for the FPC in such proceedings as the rate cases of the Panhandle Eastern Pipe Line Co., El Paso Natural Gas Co. and Cities Service Natural Gas Co. He also handled the cases involving the applications by the Tennessee Gas & Transmission Co. and the Hope Natural Gas Co. for certificates of public convenience and necessity to construct natural gas pipe lines into the Appalachian area.

Effect Savings

Since Franks revolutionized the producing division of the oil industry with its "Slim-hole" 100% portable drilling rig and 100% portable telescoping derrick servicing unit, the trend has been toward greater economy in drilling and servicing operations.

Many have tried to copy Franks equipment, but Franks has stayed ahead of the parade with constant improvements.

Franks portable rotary drilling rigs are complete with derrick, crown block, stacking board, swivel, kelly, rotary table, drawworks, pumps and power plant, all unitized on a single truck. The derrick folds down over the truck for moving. Blocks and lines remain strung in moving.

Franks rigs eliminate the cost of permanent derricks, save considerably in rig-up, tear-down and moving time, save in water, fuel and labor, since they are designed for a three man crew.

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Franks Truck-Mounted Portable Rotary Drilling Rig with a 96 ft. derrick as an integral part operating at night. The derrick folds down over the truck for moving. This rig is capable of drilling to 6,000 ft.

Exploration and Drilling

Week's Highlights

THE most significant point in the Petroleum Administration's explanation of its assigned record-production quotas to oil states in December is that in most instances the certified averages represent maximum productivity. The industry has long realized that most states were at or above their maximum efficient productive capacity but the quotas approved for December place comparatively minor stress on the "efficiency" factor. In other words, next month the nation will be liquidating its existing petroleum reserves at the highest possible level, except in Texas, and in portions of the Rocky Mountains.

The moderate increase assigned District 2, the PAW frankly admits, is based partially on anticipated output from certain newly discovered producing areas. Consequently, part of the quota may be considered hardly more than wishful thinking although it is true that sound reasoning enters into the calculations, and in all probability the PAW estimates will be confirmed by performance. The necessity of including a speculatory factor in arriving at production quotas which reflect demand as accurately as possible emphasizes, nevertheless, the prevailing hairline balance between current supply and requirements. All-out efforts of producing states to satisfy the assigned PAW quotas confirms the growing conviction within the industry that more liberal spacing regulations for numerous producing areas still restricted by PAO 11 will be inevitable by the second quarter of 1944, possibly sooner.

Exceptions already granted to PAO 11 cover extensive areas in the Middle West, the Pacific Coast and in the eastern states. Modifications of the original 40-acre spacing order may be responsible for the improved ratio of oil wells to dry holes reflected in the summary of October completions which shows that finished oil producers increased 11.2 per cent above the comparable data for 1942. Total completions in all classifications increased 12.7 per cent, reflecting the sharp advance in California field operations (p. 107).

Thirty-seven wildcat oil discoveries were registered last month, an increase of four over September but compared with 56 in August. October completions of exploratory wells totaled 286, including 238 dry holes (p. 100). Exploratory wells completed during the first 10 months totaled about 3,034, indicating that the year will end with approximately 3,600 wildcat wells on the records of the industry, considerably shy of the PAW projected program of 4,500.

EASTERN TEXAS—The Manziel pool of Wood County is extended 1/2 mile by the field's largest producer (p. 96).

NORTH CENTRAL TEXAS—New shallow Ellenburger production was opened in Cooke County, 7 miles southwest of Muenster. The well was estimated to be good for 815 bbl. of 37-gravity oil a day. The Scotland pool of Archer County was extended a mile southwest by a 150-bbl. pumping well (p. 99).

OKLAHOMA—Mid-Continent Petroleum Corp.'s Wilcox discovery is to be pinched to 250 bbl. a day. Choked down to 1/8 in. to prevent sand cutting, the well was making 80 bbl. of fluid an hour at a gas-oil ratio of approximately 9,000:1 (p. 106).

LOUISIANA GULF COAST— The first of two discovery wells of the new Reddell field in Evangeline Parish is completed in Tate sand to provide gas for future development of the new pool (p. 94).

COMPLETIONS IN ALL FIELDS . . .

(Week ended November 20, 1943)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1943	1942
N. Y., Penna., W. Va.	51	15	4	70	133,028	3,056	3,094
Ohio	6	13	6	25	63,272	835	1,015
Indiana	1	0	0	1	1,988	197	300
Kentucky	4	0	2	6	9,056	406	169
Illinois	20	0	8	28	67,891	1,564	1,636
Michigan	2	0	11	13	33,384	562	613
Kansas	18	0	18	36	122,839	1,503	1,372
Nebraska	1	0	0	1	2,163	27	30
Missouri-Iowa	0	0	0	0	0	17	13
Oklahoma	7	3	10	20	71,471	1,050	1,035
Texas:							
North Central Texas	22	1	21	44	99,520	1,325	948
West Texas	17	0	4	21	88,604	814	1,206
Texas Panhandle	0	0	0	0	0	160	307
Eastern Texas	12	2	5	19	93,591	270	358
Texas Gulf Coast	4	0	8	12	84,460	417	616
Southwest Texas	5	0	15	20	98,914	815	929
Total Texas	60	3	53	116	465,089	3,801	4,364
North Louisiana	6	0	2	8	16,047	293	433
Louisiana Gulf Coast	6	0	3	9	90,961	327	405
Total Louisiana	12	0	5	17	107,008	620	838
Arkansas	3	0	2	5	24,868	240	160
Mississippi and Southeast	1	0	5	6	30,042	89	55
Montana	3	0	2	5	10,622	210	179
Wyoming	1	0	0	1	4,683	120	100
Colorado, Utah	0	0	0	0	0	22	22
New Mexico	5	0	1	6	15,101	202	211
California	27	1	4	32	100,128	1,210	688
Total United States	222	35	131	388	1,262,633	15,731	15,894
Total previous week	215	54	114	383			
Week ending Nov. 21, 1942	193	33	93	321			

LOUISIANA GULF

Reddell Field Discovery Completed in Tate Sand Zone of Sparta Section

NEW ORLEANS, La.—Passing up Wilcox production at this time, to insure sufficient gas for drilling other wells in the field, Continental Oil Co. and Humble Oil & Refining Co. completed 3 Pardee Lumber Co., 20-4s-1w, at Reddell in Evangeline Parish, in the Tate sand zone of the Sparta section. The well had previously shown oil production in perforations at 10,430-45 ft. and gas-condensate production at 10,358-70 ft., in the Wilcox zone. Completion was made through 118 perforations opposite the Sparta at 9,960 to 10,000 ft. The well flowed 156 bbl. a day through 7/64-in. choke at top and 9/64-in. bottom choke against tubing pressure of 1,050 lb. Gravity of the oil is 56.6 A.P.I. This is the official discovery well of the Reddell field as Danciger Oil Refining Co. et al's test 1¼ miles east, was still testing. Danciger et al are completing in the same Sparta zone. Operators first perforated with 156 holes at 9,914-55 ft., ran drill-stem test and the well showed 2,700 lb. pressure and flowed 56.2-gravity condensate. Additional perforations were made at 9,905-11 ft. for the completion attempt.

Vermilion Parish.—Union Oil Co. of California is preparing to drill a second test in the Freshwater Bayou area of Vermilion Parish. Work in the area has been suspended since November 1942, when 1-C Louisiana Furs, the discovery well, was completed as a gas-condensate producer from perforations at 11,126-34 ft. The new test will be the 2-C Louisiana Furs, about 9,000 ft. west of the discovery. Another new wildcat for this parish is Texas Co. 1 State-Vermilion Bay, Lease 340, lying northwest of the U. S. Coast Guard Station "Muddy" in Vermilion Bay. This will be a 11,000-ft. test.

SOUTH LOUISIANA WILDCAT COMPLETIONS

Iberville Parish.—Sugarfield Oil Co. 1 Iberville Mortgage & Loan Co., discovery well, Rosedale field, 74-7s-10e, T. D. 10,500 ft., 5½-in. set about 10,400 ft., perforated 12 shots at 10,009-12 ft.; potential 215 bbl. 34.6-gravity oil daily, 7/64-in. choke; T.P. 1,625 lb.; C. P. 1,700 lb., no water, G.O.R. 400-1.

Terrebonne Parish: Falcon Seaboard Drilling Co. and William Helis 1 Jackson est., 1 mi. E of NE Gibson production, 25-17s-15e, T.D. 10,600 ft., 5½-in. at 9,561 ft.; perforated 56 shots 9,280-90 ft. Produced 225 bbl. 33.7-gravity oil, 9/64-in. choke; T.P. 1,150 lb.; C.P. 1,200 lb., no water.

St. Martin Parish.—Amerada Petroleum Corp. is preparing to set casing in the 1 Bertinot-Quebedeaux Unit, Section 44-7s-5e, wildcat in the Arnaudville area, to test oil shows found above 10,500 ft. The test was drilling ahead below 10,720 ft. while 5½-in. casing was being hauled to the location.

Acadia Parish.—Continental Oil Co. 1 G. T. Duhon, 36-10s-2w, at Mermentau, is drilling below 9,100 ft. This test is being watched with considerable interest as it is in the area where Continental took over H. M. Naylor's interests some monthe ago and drilled a dry hole shortly after acquiring the properties. The company now is trying for production in another direction.

DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 20 crude oil	Distillate, allied products	Nov. PAW quota all oils	Nov. 13 crude oil
Arkansas	78,350	4,000	81,700	78,550
California	789,250	46,000	842,000	786,750
Colorado	7,275	.....	7,000	7,300
Eastern fields	71,100	6,000	86,800	70,900
Illinois	215,600	11,500	217,600	228,350
Indiana	13,175	....	14,000	14,610
Kansas	281,350	4,900	291,000	288,900
Kentucky	22,345	2,200	27,500	24,775
Louisiana	350,930	27,000	375,700	350,750
North Louisiana	78,730	.....	.....	78,600
Louisiana Gulf Coast	272,200	.....	.....	272,150
Michigan	50,100	100	56,100	60,600
Mississippi	46,735	.....	49,000	52,500
Montana	21,600	300	23,300	21,375
Nebraska	1,750	.....	1,600	1,700
New Mexico	112,550	5,400	116,600	112,100
Oklahoma	326,650	27,000	346,000	327,700
Texas	1,924,350	116,000	2,004,000	1,923,800
East Texas	376,450	.....	.....	376,400
West Texas	359,700	.....	.....	359,750
North Central Texas	142,000	.....	.....	141,900
East Central Texas	137,950	.....	.....	137,550
Texas Panhandle	85,500	.....	.....	85,500
Texas Gulf Coast	722,150	.....	.....	722,150
Southwest Texas	100,600	.....	.....	100,550
Wyoming	100,950	2,000	100,800	98,750
Total United States	4,414,060	252,400	4,640,700	4,449,410

Total production January 1-November 20, 1943 ..... 1,322,502,950 bbl.
Same period last year ..... 1,260,349,620 bbl.

MICHIGAN

Ten Wildcat Failures Blight Michigan Activity

SAGINAW, Mich.—Wildcatting continued unsuccessfully in Michigan last week, 10 tests being completed as dry holes. One other test was also dry and only two producers were completed; one, in Osceola Township, Osceola County, flowing 49 bbl. in 15 hours after acid treatment. The other, in Bangor Township, Van Buren County, pumping 400 bbl. a day, after acid. The Osceola well was drilled by Sun Oil Co., the one in Van Buren by Grimes & Son, Inc.

With Reed City production holding steady, the 3,345 producing wells in Michigan produced an average of 53,762 bbl. a day in October for a total of 1,666,622 bbl., the Michigan Oil & Gas Association reported. Reed City's field average was 19,130 bbl. daily, four times more than the second place Headquarters field in Roscommon County where the average was 4,275 bbl. Reed City production was from 185 wells, the Headquarters yield from 42.

MICHIGAN WILDCAT COMPLETIONS

Allegan County, Fillmore Township: Charles J. Smith, John Van DenBeldt, NW NE NW 13-4n-15w, dry, T.D. 1,630 ft.

Arenac County, Lincoln Township: Ervin Major 1 Peter Proulx, NE NE NW 6-18n-4e, dry in Dundee, T.D. 2,890 ft.

Moffatt Township: Charles W. Teater 1 Mary Szafarn, C N½ SE NE 30-20n-3e, dry in Berea, T.D. 1,675 ft.

Clinton County, Greenbush Township: Charles W. Teater 1 L. G. Hilbrock, C N½ NW SE 36-8n-2w, dry in Dundee, T.D. 2,860 ft.

Gladwin County, Hay Township: Basin Oil Co. 1 Harriet L. Calkins, S½ SE NW 35-18n-1e, dry in Dundee, T.D. 3,600 ft.

Kent County, Byron Township: Columbia Gas & Oil Co. 1 John Budenger, SW SW NE 19-5n-12w, dry in Traverse limestone, T.D. 1,804 ft.

Montcalm County, Day Township: Southwest Development Co. 1 John T. Hopkins, NE NE NW 18-11n-6w, dry in Marshall, T.D. 1,361 ft.

Oceana County, Crystal Township: William K. Swan 2 M. E. Skidmore, N½ NW SW 10-16n-16w, dry, T.D. 3,336 ft.

Osceola County, Sherman Township: Gordon Oil Co. 1 Mabel Wood, C S½ SW SE 21, dry in Dundee, T.D. 3,960 ft.

TEXAS GULF COAST

Raccoon Bend Flank Well Testing Hard Wilcox Sand

HOUSTON, Tex.—Pan American Production Co. 1 Austin College, W. C. Harvey Survey, on the southwest flank of Raccoon Bend dome, Austin County, was being watched with interest as the company prepared to test shows in two sands just below top of the Wilcox, which was topped at 7,300 ft. After drilling 9,519 ft. operators set 5½-in. casing at 7,685 ft. to test sands at 7,300-10 ft. and 7,317-27 ft. Sands were hard and tight.

Polk County.—Humble Oil & Refining Co. 3-B W. F. Carter, Andres Morales Survey, deep Wilcox test on northwest flank of the Segno field, failed to find commercial shows in drilling to 10,176 ft.

Galveston County.—The Alta Loma field was limited on the west side by completion of Stanolind 9 John A. Hulen as on oil-salt water well at total depth of 9,184 ft. There was a dry hole separating this test and the field proper. The well flowed 24 bbl. of oil per day with 73 bbl. of salt water on 3/64-in. choke with tubing pressure of 2,150 lb., and gas-oil ratio of 840 : 1.

Matagorda County.—Sun Oil C. 1 Strnadel, Section 7, Block 6, I.&G.N. Survey, 3½ miles northwest of Blessing townsite, was standing at 10,849 ft., having gone dead after flowing salt water.

The Texas Upper Gulf Coast district reported 19 new locations last week, including 6 wildcat tests.

Polk County.—Sun Oil Co. announced it would deepen 4 Herbert J. Pratt to the Wilcox in the Livingston field. This test, in Augustine Viesca League, Grant 7 A-77, will be carried to 7,350 ft. from its old total depth of 4,257 ft.

Jackson County.—A new field of Jackson County was indicated at Seaport Oil Co. 1 John M. Bennett, about 1 mile northwest of the West Ranch field and 1½ miles west of Vanderbilt townsite, in Block 30, First Subdivision J. M. Bennett ranch. The well drilled ahead below 5,320 ft. after coring to 5,093 ft. logging sand in the Marginulina zone at 5,060-68 ft., showing 13 per cent saturation. A drill-stem test at 5,060-66 ft. recovered 2,000 ft. of 25.1-gravity pipe-line oil in 15 minutes with 80 lb. working pressure. This test is on a Forest Development Co. farmout to John G. Mayo and Stewart Boyle who turned it to Seaport for drilling.

TEXAS UPPER GULF COAST WILDCAT COMPLETIONS

Jasper County: Sun Oil Co. 1 Maggie Richardson, on Antioch Prospect, 5 mi. SW of Buna, dry at 8,341 ft.

Madison County: Continental Oil 1 E Adams, Joshua Robbins Survey, dry at 5,042 ft.

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SOUTHWEST TEXAS

Sunray Completes Placedo Extension

CORPUS CHRISTI, Tex.—The Sunray Oil Corp.'s southwest extension and new pay discovery in the Placedo field, Victoria County, was completed last week flowing 65 bbl. of net oil daily, plus 43 per cent salt water on ⅛-in. choke. Pressures were 750 lb. on tubing and 1,600 lb. on casing. Perforations were from 6,699 to 6,702 ft. The oil tested 41.8 gravity. This is a new deeper pay for the field, but performance of this well proved disappointing. The test had been taken over from Superior Oil Corp. for completion by Sunray.

P. R. Rutherford, Houston, Tex., independent, completed his discovery well about 3 miles southeast from Woodsboro, and 1¾ miles northeast of the LaRosa field, Refugio County. It flowed 140 bbl. daily on 7/64-in. choke, no water, from perforations at 6,185-87 ft., in oil sand at 6,183-90 ft. This is the 1 Joe Weiss (Zengerle) SE NE¼ Section 40, Johnson-Pugh Subdivision, Bonnie View ranch. Total depth 6,502 ft. and 5½-in. casing is set at 6,309 ft. Several operators hold tracts in the new field and other development is expected soon.

Two major extension tests, which have shown for production, indicate that the Burnell-Wilcox field will be about 3½ miles long. One of these tests is in Karnes, the other in Bee County. In Bee County, Magnolia Petroleum Co. Eliz. Ingram, James Richardson Survey A-275, 2 miles southwest of the Burnell-Wilcox discovery, cored sand at 6,654-60 ft., and developed gas-condensate on drill-stem test, then cored gas sand at 6,660-92 ft., shale 6,692 to 6,700 ft., and more sand at 6,750-75 ft. Test was being run at 6,762-74 ft. In Karnes County, Stanolind Oil & Gas Co. 1 Spielhagen, in Alonzo Story Survey, A-265, 1½ miles northeast of the Burnell-Wilcox discovery well, ran drill-stem test in Reklaw sand, just above the Carrizo-Wilcox, at 6,510-17 ft., and showed for a gas well with some condensate. It was drilling ahead at 6,580 ft.

LOWER GULF COAST WILDCAT COMPLETIONS

Bee County: Dirks Bros. 2-B C. A. Dugat, 2 mi. W of Dirks field, 3 mi. NE of Mineral townsite, dry at 7,510 ft.

Jim Wells County: H. R. Smith, H. J. Mosser and W. R. Quin 1 J. E. Allen et al, 1½ mi. S of Alfred field, dry at 5,432 ft.

Kleberg County: Charles Snellstron 1 Marcus Phillips, 1 mi. NE of Kingsville, dry at 7,322 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Duval County: Sawnie Robertson 1 W. R. Peters, wildcat on SE flank Peters field, dry at 2,475 ft.

Live Oak County: W. Earl Rowe 1 William Myers est., 5½ mi. W NW of Tynan, dry at 4,626 ft.

Webb County: O. W. Killam 1 E. Garcia est., 5 mi. S SE of Mirando City, dry at 4,849 ft.

SOUTH CENTRAL TEXAS WILDCAT COMPLETIONS

Bexar County: W. T. Montgomery et al 1 W. T. Montgomery, 5 mi. NE of LaCoste, dry at 1,350 ft.

Caldwell County: Churchill Oil Co. 1 U. E. Mercer, 3 mi. NE of Fentress, dry at 2,026 ft.

Milam County: Standard Oil Co. of Texas 1 A. J. Smith (Tr. 2), 6 mi. N of Gause, dry at 5,900 ft.

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EASTERN TEXAS

Manziel Pool Extension Proves Best Well in Field

DALLAS, Tex.—Sun Oil Co. 1 Scoggins, Samuel Burch Survey, 2,000 ft. southwest extension to the Manziel pool of Wood County, proved to be the best well so far completed, flowing 260 bbl. the first 5 hours, through open tubing the first 2 hours and through ⅜-in. choke the last 3 hours. On the basis of this gage, the well is good for 1,250 bbl. per day. Largest previous well was Shell Oil Co. Inc. 1 Bailey, west offset to the discovery, which was good for 178 bbl. per day. The field now has five oil wells. Three dry holes have been drilled on the south and southeast sides. A half mile southeast of production, Shell 1 Whatley, John Polk Survey, is drilling below 8,120 ft., exploring the lower formations.

Hunt County.—Humble Oil & Refining Co. 1 Rutherford was a failure in the Smackover in drilling to 7,483 ft., and plugged back to 4,790 ft. to test the Pettit.

EAST TEXAS WILDCAT COMPLETIONS

Harrison County: Siosi Co. 1 T. C. Lindsey, 1,980 ft. from N, 660 ft. from W, 210-ac. tract, Daniel Rouse Sur., 2½ mi. NW Jonesville, elev. 257 ft., Paluxy 2,738 ft., Glenrose 3,125 ft., Pettit 5,712 ft., Travis Peak 6,050 ft., dry, T.D. 6,418 ft.

Hunt County: Stanolind Oil & Gas 1 G. V. Wilkins, 2,842 ft. from N, 330 ft. from W, 64-ac. tract, E. F. Anderson Sur., elev. 494 ft., Paluxy 4,416 ft., dry, T.D. 4,434 ft.

Houston County: C. B. Culmore 1 Mrs. C. J. Stephens, 330 ft. from N, 330 ft. from E, 45.9-ac. tract, John Forbes Sur., elev. 186 ft., dry, T.D. 3,300 ft.

Panola County: W. C. Feazel and N. V. Kinsey 1 H. C. Jordan, 419 ft. NW, 623 ft. SW from N'ly SE cor. 87-ac. tract, or 1,775 ft. from NE, 2,120 ft. from NW A. Moorman Sur., elev. 325 ft., flow 30 bbl. distillate, 79,000,000 cu. ft. gas from lower Pettit 5,944-68 ft., 112,000,000 cu. ft. gas from upper Pettit 5,778-5,818 ft., Travis Peak 6,152 ft., T.D. 6,203 ft., gas discovery.

CALIFORNIA

East Raisin City Extension Test Nearing Verdict

LOS ANGELES, Calif.—An effort to extend production in the East Raisin City field in Fresno County will be made soon in the Edwin and Harold Pauley 31-29 Raisin City, 29-15s-18e, from which cores of oil sand in the Miocene have been recovered.

Standard Oil Co. of California 1-28 Pleasant Valley Farming, 28-39s-16e, will be tested in a few days. Operators are making additional hole before starting a production test but the water string has been cemented at 8,941 ft.

Kern County.—Pacific Western Oil Co. is progressing with its outpost on the north flank of the Tupman section of the Elk Hills field and at 9,000 ft. still has another 1,000 to 2,000 ft. to go before reaching the Stevens. This outpost is in 26-30s-24e and will extend the area covered by the Stevens sand of Miocene age, if productive. The Capital Co. has made location for a test in 24-30s-24e.

Los Angeles County.—The last obstacle standing in the way of Seaboard Oil Co.'s proposal to drill within the corporate limits of Los Angeles was removed a few days ago when the Los Angeles city council established at 14-acre drilling district adjoining the northwest corner of Elysian Park.

Standard of California has reentered Pico Canyon where the company first developed commercial production in 1876 and will drill a deep test. The first deep test will be drilled in 1-3n-17w and will be known as 42 P.C.O.

Wilmington. — Development work has shown a consistent increase in the Wilmington field during the past several weeks and if additional crews were available it would no doubt top the list in drilling. As it is, Wilmington is the most active field in the Los Angeles Basin and is not far behind Midway-Sunset which is several times larger. There are 35 additional wells projected at Wilmington and the problem is how to get them drilled as quickly as desired.

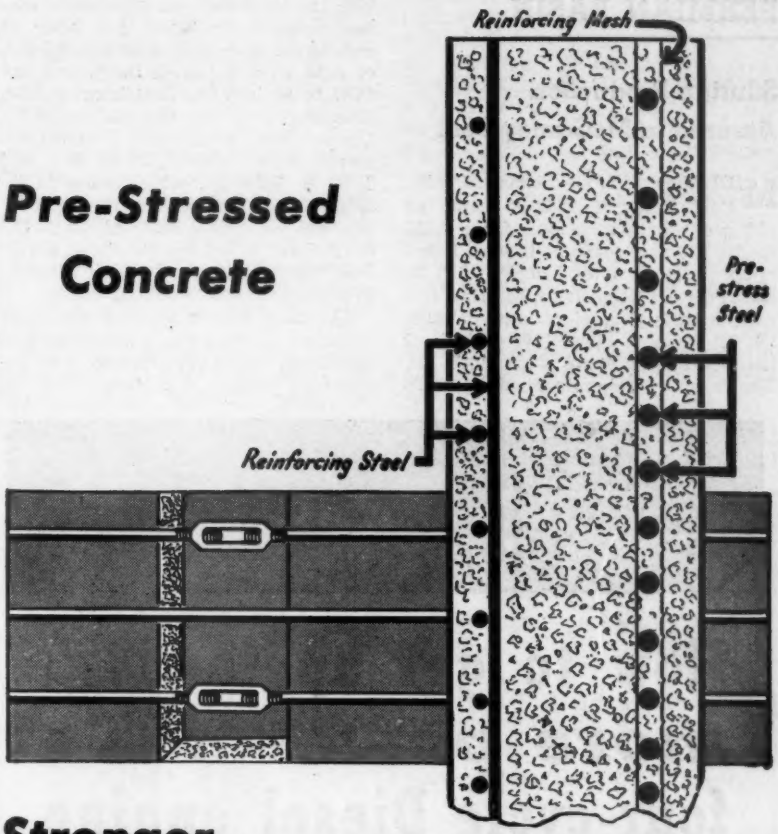
CALIFORNIA WILDCAT COMPLETIONS

Aliso Canyon wildcat district, Los Angeles County: General Pet. Corp. 1 Mendota, 22-3n-16w, dry, T.D. 6,834 ft.; formation test 1,300-2,000 ft. recovered water.

Fairview wildcat district, Orange County: P. M. Girard 1 Mark Fisher, 17-5s-10w, dry in gray sand, T.D. 5,655 ft., redrilled to 4,550 ft. where pipe stuck and could not be recovered, slight oil showing at 4,600 ft.

Hanford wildcat district, Kings County: Seaboard 66-2 Phillips, 2-19s-22e, dry at T.D. 6,633 ft., Kreyenhagen 6,132 ft., Domengine 6,328 ft.

Puente wildcat district, Orange County: Melvin Hansen 2 Puente, 24-2s-10w, dry in gray sand, T.D. 1,228 ft., no showings.



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PERMIAN BASIN

Silurian Production Assured in McCamey Pool

MIDLAND, Tex.—Texas Pacific Coal & Oil Co. 52-A Lane, an old well drilled deeper from 2,151 ft. to Ellenburger which was found nonproductive at total depth 8,358 ft., assured production from Silurian formation through perforations at 7,160-90 ft. when it flowed 85 bbl. in 2 hours after acidizing with 1,000 gal. The rate of flow dropped to 93.94 bbl. in 16 hours on next test, and had dropped to 4 bbl. per hour at end of the test, after which 8,000 gal. of acid were injected, increasing the flow to 54 bbl. the first hour of test, dropping to 13 bbl. the last hour of a 5-hour test. Additional perforations were made from 7,125-60 ft., and 7,190 to 7,200 ft., which were to be acidized and tested. The new discovery lies 41 miles east of Gulf Oil Corp. 5 and 6 Wristen Brothers, southeast Ward County, only other Silurian producers in the Permian basin.

The new Mabee pool of Southeast Andrews County was widened in two directions when production was assured at Texas Co. 2 Mabee, SW NE Section 44, Block 40, G.&M.M.B.&A. Survey, 1 mile southwest of the discovery well, when stained dolomite was cored from 4,710-30 ft., and casing was being run. Texas Co. 3 Mabee, SE NW Section 32, Block 40, 1 mile northeast of the discovery, swabbed 50 bbl. in 4 hours after running tubing to 4,708 ft., total depth 4,710 ft.

A 2-mile southeast extension for the Fullerton pool of Andrews County was affected by Mid-Continent Petroleum Corp. 1-B University, NW NE Section 16, Block 13, University Survey, which flowed 179 bbl. 41-gravity oil from 6,878 to 7,177 ft., plugged back from total depth 7,458 ft.

WEST TEXAS WILDCAT COMPLETION

Andrews County: Mid-Continent Pet. Corp. 1-B University, NW NE Sec. 16, Blk. 13, University Sur., flow 179 bbl., pay 6,878 ft., P.B. to 7,458 ft., 2-mi. SE extension to Fullerton pool.

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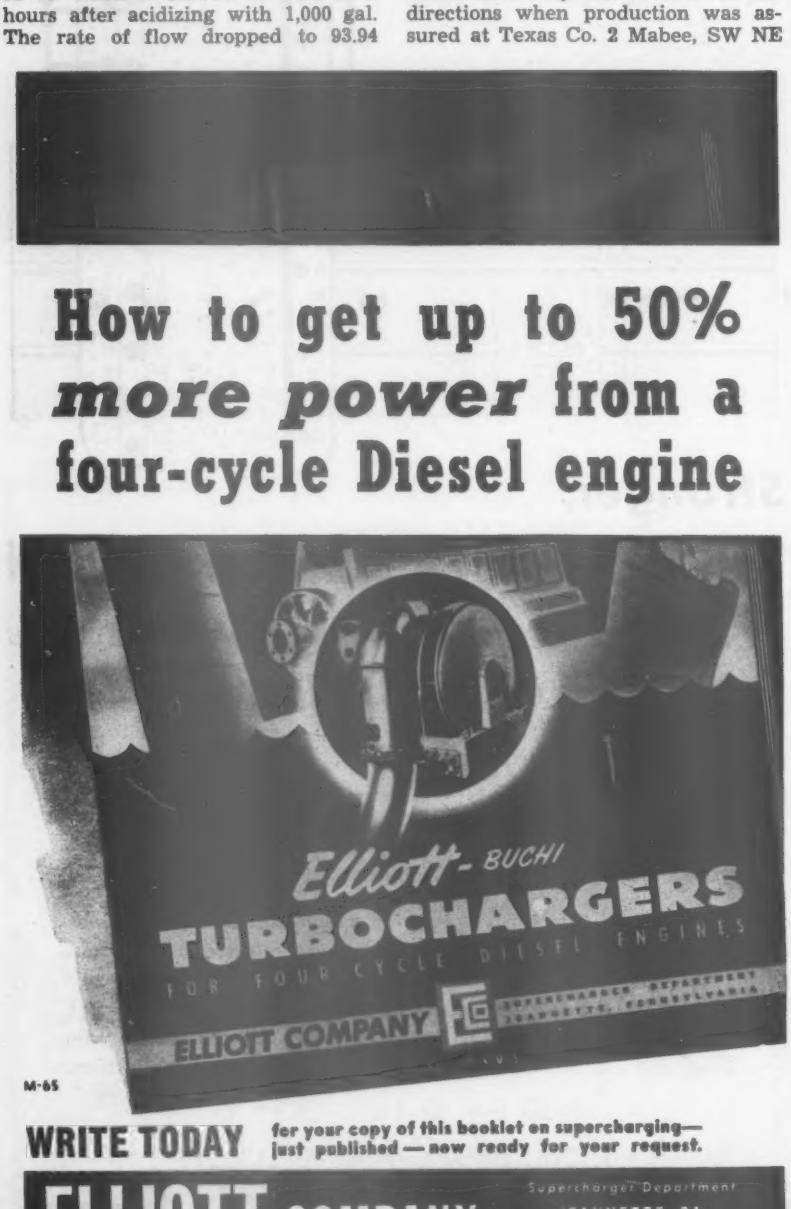

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SOUTHEAST NEW MEXICO

HOBBS, N. M.—Eddy County continues to hold most of the interest in the Southeast New Mexico district, with two new shallow wildcats staked during the week, both of them in the Carlsbad area. H. W. Martin 1 State is a new test, SE SE 27-21s-27e, 3 miles east of Carlsbad and 6 miles southwest of the Page pool. Addison Oil Co. has staked 1 State in NE SW 20-20s-28e, 9 miles north of Carlsbad and 6 miles west of the Russell pool.

SOUTHEAST NEW MEXICO WILDCAT COMPLETION

Eddy County: D. D. Thomas 1 Johnson, NE SE 28-16s-31e, 1 mi. NE Square Lake pool, show gas 3,050 ft., S.O. 3,434-45 ft., 3,475-90 ft., dry, T.D. 4,302 ft.

APPALACHIAN FIELDS

Butler Wildcat to Seek Gas in Queenston Shale

PITTSBURGH, Pa.—The deep wildcat of Manufacturers Light & Heat Co. on the J. G. Hockenberry farm in Mercer Township, Butler County, passed through dry Clinton sand. It will be deepened through the Queenston red shale in the hope of picking up stray gas.

Fayette County.—In Wharton Township, Greensboro Gas Co. reached 220 ft. in the Onondaga chert in 4 Barton with a volume of gas from the chert beds of 1,250,000 cu. ft. The chert was topped at 6,985 ft.

WEST VIRGINIA

Gilmer County.—Hope Natural Gas Co. 8,802 Lewis Bennett in Center district, normally a gas well as no oil is produced in this vicinity, struck about 20 bbl. of oil a day in the Maxton sand at 1,615 ft.

Tucker County.—The Ohio Oil Co. wildcat on the Kaemerling tract, Dry Fork district, on the Blackwater anticline is again drilling at 7,968 ft.

N. CENTRAL TEXAS

New Ellenburger Pool Opened in Cooke County

WICHITA FALLS, Tex.—Phillips Petroleum Co., Perkins & Bourland 1 Dangelmeyer, Eleanor Langford Survey, 7 miles southwest of Muenster, opened a new Ellenburger pool for southwest Cooke County by flowing at the rate of 815 bbl. oil per day from lime at 2,174-81 ft. after washing with 200 gal. acid. The new strike lies on the ridge which cuts across western Cooke County in a northwest-southeast trend accounting for the shallow depth at which the Ellenburger was encountered. The potential was based on a flow of 85.25 bbl. in 2½ hours. Gravity of the oil is 37.4° A.P.I. The Bindel and Voth pools of Cooke County have wells producing from the Ellenburger, but the productive areas are not large.

The Scotland pool of Archer County was extended a mile southwest by S. D. Johnson 1 Wilson, Lot 4, Block 78, A.T.N.C.L. subd., which topped the Caddo lime pay at 5,130 ft., with saturation to 5,192 ft. It is being deepened to test the Mississippian. G. W. Cooper 1 J. R. Parkey, Section 1, S.P. R.R. Survey, northern Archer County, was estimated good for 150 bbl. per day on pump from sand, total depth 4,351 ft. This new well, 4 miles southwest of Holliday, opens a new pool, and has been offset on the west by Cooper 2 Parkey.

Montague County.—Mid-Continent Petroleum Corp. 1 Freeman, Block 20, J. Y. Castillo Survey, 1½ miles west by north of the Rogers and Rogers pool, had sand showing oil from 4,689-93 ft., cored from 4,693 to 4,704 ft., and was drilling ahead. Contract depth is 6,250 ft., or Ellenburger.

Clay County.—Shell Oil Co., Inc., 1 R. F. Wynn, Rooney Survey, west of Bellevue, bottomed at 6,795 ft. in Ellenburger, topped at 6,706 ft., ran 5½-in. casing to 6,691 ft. and was to make a test before plugging back to perforate opposite the shows in Mississippian from 5,447-70 ft.

Hardeman County.—Humble Oil & Refining Co. 1 Dodson, Section 49, Block 10, H.&T.C. Survey, total depth 7,301 ft., plugged back to 6,520 ft., treated granite wash pay with 1,000 gal. of acid and flowed 12 bbl. of oil per hour after being shut in for 5 hours.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: Akin & Dimock 2 D. H. Skinner, 1,300 ft. from E, 800 ft. from S, Lot 20, J. W. Harris Club Ranch subd., dry, T.D. 1,484 ft.

Grace & Grace 1 J. B. Frerich, 1,900 ft. from S, 600 ft. from W, Sec. 106, Blk. 4, Clark & Plumb subd., dry, T.D. 1,260 ft.

S. D. Johnson 1 W. M. Coleman, Sec. 31, William Coleman subd., Caddo 5,406 ft., dry, T.D. 6,013 ft.

White & Duncan 1 Lorena Kinder, Sec. 111, Blk. 4, Clark & Plumb subd., dry, T.D. 1,193 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—Two new producers have been completed in the old Hilburn pool of southwest Eastland County by Texas Mineral Lands Co. The 1 Sherrell, Ahrenbeck Survey, is estimated good for 300 bbl. per day from Caddo lime at 2,752 ft., flowing through 2-in. tubing, while 1 Hilburn, Hickman Survey, is estimated good for 100 bbl. per day after acidizing the Ranger lime at 3,130 ft. with 2,500 gal.

The Taylor County wildcat, Lewis Production Co. 2 N. D. Teaff, Lot 9, League 122, W. R. Willis Survey, is estimated good for 50 bbl. natural from Flippen lime at 2,295 to 2,319 ft.

In eastern Shackelford County, on the west flank of the old Ibex pool, Phillips Petroleum Co. 1 Buford had a show of oil from 3,435-48 ft., but showed only mud on drill-stem test from 3,433-48 ft., and was drilling ahead to test the Ellenburger.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Brown County: O. B. Perot 1 R. L. Coffee, 250 ft. from E, 500 ft. from S, Simeon Saunders Sur., dry, T.D. 1,180 ft.

Jones County: R. H. Roark 1 Jewett L. White, 330 ft. from S and E, SW Sec. 26, Deaf & Dumb Asylum Lands, elev. 1,575 ft., dry, T.D. 3,010 ft., shale.

Shackelford County: R. H. Roark 2 W. H. Green, 330 ft. from N, 1,980 ft. from W, Sec. 49, Blk. 12, T.&P. Ry. Sur., dry, T.D. 1,214 ft.

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MONTHLY WILDCAT COMPLETION RECORD, AUGUST-OCTOBER 1943

	Oil			Distillate			Gas			Dry			Total		
	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.	Aug.	Sept.	Oct.
Ohio	2	1	0	0	0	0	3	1	1	9	4	12	14	6	13
Indiana	0	0	1	0	0	0	0	0	0	2	2	1	2	2	2
Kentucky	4	4	1	0	0	0	1	0	0	8	5	11	13	9	12
Illinois	11	10	11	0	0	0	0	0	1	48	20	25	59	30	37
Michigan	4	0	1	0	0	0	0	1	0	22	21	24	26	22	25
Kansas	5	3	1	0	0	0	0	0	1	19	37	25	24	40	27
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	0	0	5	6	0	5	6
Oklahoma	5	3	3	0	1	0	3	0	3	32	22	19	40	26	25
Texas:															
North Central	13	3	6	0	0	0	0	0	0	54	29	26	67	32	32
West	5	3	1	0	0	0	0	0	0	11	5	6	16	7	7
Panhandle	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0
East	0	0	1	0	0	0	0	0	1	14	7	6	14	7	8
Gulf Coast	0	0	2	0	1	0	0	0	0	12	5	15	12	6	17
Southwest	1	1	3	1	1	0	0	2	1	24	27	20	26	31	24
Total	19	6	13	1	2	0	0	2	2	117	73	73	137	83	88
Louisiana:															
North	1	0	1	0	0	0	1	0	0	4	3	5	6	3	6
Gulf Coast	1	1	0	0	2	1	0	0	0	4	2	2	5	5	3
Total	2	1	1	0	2	1	1	0	0	8	5	7	11	8	9
Arkansas	0	0	0	0	0	0	0	0	0	6	4	4	6	4	4
Mississippi	1	0	2	0	0	0	0	0	0	4	5	9	5	5	11
Montana	0	0	2	0	0	0	0	0	1	1	6	5	1	6	8
Wyoming	0	0	0	0	0	0	0	0	0	2	1	1	2	1	1
Colorado, Utah	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
New Mexico	2	3	0	0	0	0	0	0	0	5	1	2	7	4	2
California	1	2	1	0	0	0	1	2	1	16	14	12	18	18	14
Total	56	33	37	1	5	1	9	6	10	299	225	238	365	269	286

A REVIEW of the monthly wildcat record shows a small increase in the total number of new oil wells found during October. Texas made the greatest gain, having 13 oil wells completed, compared with 6 the previous month.

The Chitwood Simpson pool of Pratt County, Kansas, was probably the most important discovery, while the balance were extensions to producing areas. By the end of October there were three wells in the field and five under way. Lion Oil Refining Co., which discovered the new field, is endeavoring to make the wells three-zone producers. The main pay is the Simpson at around 4,550 ft.

Wildcat completions in October, totaling 286, averaged 71 weekly which is an improvement of 17 wells weekly over the rate prevailing in September when records for 5 weeks were included. Thirty-seven oil discoveries in October averaged more than nine a week against less than seven weekly in September.

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CANADIAN FIELDS

Vermilion Extension Operations Are Under Way

CHATHAM, Ont. — Two important attempts are being made to extend the proven area of the Vermilion field in eastern Alberta. Apex 1 has been spotted in LSD 9, 22-49-6w4, about 6 miles southwest of production, while Iscris 1, sponsored by W. de Koch, has location in LSD 13, 36-53-6w4, about 20 miles north of production. John L. Graham and Toronto associates have secured a reservation of 19,680 acres extending east of the Vermilion field to Lloydminster and are arranging to drill.

Southwest Turner Valley.—Following completion of Imperial-Hudson's Bay 15, LSD 1, 8-18-2w5, as one of the field's largest producers, systematic efforts will be made to extend the Turner Valley producing area to the south. Immediately to the east, Major-National 1 is being started in LSD 1, 9-18-2w5. Farther south, arrangements are being made to complete Theo Grewar 1, 5-18-2w5, about ½ mile south of the present most southerly producer.

Taber.—Finding that Mid-Continent Oil & Gas 1, LSD 10, 12-8-17w4, was apparently on the east edge of an oil pool, Mid-Continent 3 is being started ¾ mile southwest as part of an eight-well joint drilling program sponsored by the Mid-Continent company and Standard Oil Co. of British Columbia. Mid-Continent No. 1 got a commercial gas flow in the Bow Island sand between 2,304-08 ft., oil saturation accompanied by water, in the Taber sand at 3,208-15 ft.; some saturation in a yellow sand, 3,285-92 ft.; strong saturation in a repeat of this sand from 3,303-12 ft., and porosity and saturation in a 10-ft. core from the Madison limestone. No. 3 is being drilled where the oil-bearing horizons are at shallower depth and believed safely above the water horizon. A production string is being run to the top of the Bow Island sand.

ROCKY MOUNTAIN

Union Buys Glacier Production Co.

DENVER, Colo.—Another major oil deal was reported this week when it was announced that the Union Oil Co. of California has acquired the producting and refining properties of the Glacier Production Co. in the Cut Bank field in Montana. The company is one of the three largest producers in the field, the others being the Santa Rita Oil & Gas Co., which was acquired recently by the Carter Oil Co., and the Texas Co.

The Glacier holdings include approximately 90,000 acres of oil and gas-producing properties. The company operated 147 wells, producing 3,300 bbl. of crude oil daily. The refinery at Cut Bank has a charging capacity of 3,140 bbl. daily and a cracking capacity of 2,400 bbl. In addition, the natural-gasoline plant, and bulk sales distributing facilities in Montana and Idaho are included.

Northeast Colorado wildcat. — A new wildcat in northeastern Colorado has been spotted in Yuma County. Mutual Oil Co. of Kansas 1 Fletcher, SE SE SE 27-1s-46w, is about ready to spud with rotary tools.

Little Buffalo Basin test. — Fred Goodstein's deep test on Little Buffalo Basin, Park County, Wyoming, is showing up a little better, but whether it will make a discovery is not certain. It had the top of the Tensleep at 4,785 ft., and a drill-stem test at 4,790-4,826 ft. showed 6 stands of water. Another at 4,826-58 ft. showed 3 joints of oil and 7 joints of water.

MONTANA WILDCAT COMPLETION

East Utopia, Liberty County: Texas Co. 1 State, NW SE SE 16-33n-4e, T.D. 2,579 ft., 7-in. 2,502 ft., Madison 2,578 ft., 20 bbl. per day on the pump. Discovery well.

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CRUDE PRICES

OKLAHOMA AND KANSAS GRAVITY TABLES

	1	2	3	4	5	6
Below 21				$.85	$.85	
21-21.9				.87	.87	
22-22.9				.89	.89	
23-23.9				.91	.91	
24-24.9				.93	.93	
Below 25	$.92					
25-25.9	.95	$.95		.95	.95	
26-26.9	.97	.97		.97	.97	
27-27.9	.99	.99		.99	.99	
28-28.9	1.01	1.01	$1.01	1.01	1.01	
29-29.9	1.03	1.03	1.03	1.03	1.03	
30-30.9	1.05	1.05	1.05	1.05	1.05	$1.05
31-31.9	1.07	1.07	1.07	1.07	1.07	1.07
32-32.9	1.09	1.09	1.09	1.09	1.09	1.09
33-33.9	1.11	1.11	1.11	1.11	1.11	1.11
34-34.9	1.13	1.13	1.13	1.13	1.13	1.13
35-35.9	1.15	1.15	1.15	1.15	1.15	1.15
36-36.9	1.17	1.17	1.17	1.17	1.17	1.17
37-37.9	1.19	1.19	1.19	1.19	1.19	1.19
38-38.9	1.21	1.21	1.21	1.21	1.21	1.21
39-39.9	1.23	1.23	1.23	1.23	1.23	1.23
40 and above	1.25	1.25	1.25	1.25	1.25	1.25

OKLAHOMA FLAT PRICE

Cumberland	$1.14
Pure Oil Co., 9-4-41.	

OKLAHOMA AND KANSAS TABLE EXPLANATION

Column 1 Mid-Continent grades:
Pure Oil Co., 5-20-41.
Gulf Oil Corp., 5-20-41.
Skelly Oil Co. (Kansas only), 5-19-41.
H. F. Wilcox Oil & Gas Co., 5-20-41.
Gulf, in Jackson and Tillman counties, Oklahoma, effective 9-11-43.

Column 2 Mid-Continent grades:
White Eagle Oil Purchasing Co., Inc., 5-19-41, Kansas only.
Sinclair Prairie Oil Marketing Co., 5-20-41

Column 3 Mid-Continent grades:
Continental Oil Co., 5-19-41.
Phillips Petroleum Co., 5-19-41.
Tide Water Associated Oil Co., 5-20-41.

Column 4 Mid-Continent grades:
Standard Oil Co. (Indiana), 5-20-41.
National Refining Co., 5-20-41.
Carter Oil Co.

Column 5 Mid-Continent grades:
Magnolia Petroleum Co., 10-1-43.
Shell Oil Co., Inc., 10-1-43.
Ben Franklin Refining Co., 9-7-43.

Column 6 Oklahoma:
Champlin Refining Co., 5-20-41.

LOUISIANA AND SOUTHERN ARKANSAS TABLE EXPLANATION

Standard Oil Co. of Louisiana, 5-22-41.
Column 1 applies to Atlanta, Buckner, Magnolia, Schuler (Jones sand), Village, and Lewisville fields.
Column 2 applies to De Soto, Sabine, Fouke, Homer, Miller County, Sugar Creek, and Nebo.
Column 3 applies to Little Creek, Olla, and South Olla (4-3-43).
Column 4 applies to Bayou Mallet, Choctaw, Darrow, Jeanerette, Lirette, North Crowley, South Crowley, Port Barre, Potash, Roanoke, St. Martinville, and Port Allen.
Column 5 applies to University (Baton Rouge). Posted 6-2-42.
Column 6 applies to Cotton Valley crude, Rodessa and Shreveport (Cross Lake); also Anse La Butte, effective 8-1-41, starting at 80 cents for below 21°, also to Caddo effective 10-15-41.
Continental Oil Co., 5-21-41.
Column 7 applies to Abbeville, Louisiana.
Stanolind Oil & Gas Co., 5-21-41.
Column 8 applies to East and West Hackberry.
Column 9 applies to Caddo Parish, effective 10-15-41.
Column 9 applies to Evangeline, Acadia Parish.
Lion Oil Refining Co., 5-22.41.
Column 1 applies to Reynolds lime, Jones sand, Schuler, Ark.
Column 2 applies to El Dorado, West and South Rainbow fields, Snow Hill, and Schuler-Morgan sand.
Placid Oil Co., 5-22-41.
Column 3 applies to Olla.
Column 2 applies to Nebo field.
Shell Oil Co., Inc., 5-20-41.
Column 10 applies to Roanoke, Chalkley
Column 11 applies to Iowa, Black Bayou.
White Castle.
Column 12 applies to Gibson, South Houma, Hester, West Lake Verret.
Magnolia Petroleum Co., 5-21-41.
Column 13 applies to Lockport, Cameron Meadows, and West Gueydan, La.
Column 6 applies to Haynesville, Cotton Valley, Rodessa, La., and Miller County, Arkansas.
Phillips Petroleum Co., 3-29-41.
Arkansas Fuel Oil Co., 2-19-42.
Column 1, Schuler (Jones sand), except schedule starts at 70 cents for below 25° gravity.
Gulf Refining Co., 5-21-41.
Column 9, Jennings.
Column 8, Edgerly, Starks, Vinton, East Hackberry, Cameron Meadows, and Leesville.
Column 16 applies to Grand Bay, Quarantine Bay, Timbalier Bay, and West Bay, except schedule starts at $1.12 for below 28° gravity.
Column 6 applies to Caddo, Homer, Bull Bayou, Crichton, De Soto, Haynesville, and El Dorado.
Column 4 applies to West Gueydan, effective 5-25-42.
Pure Oil Co., 4-22-41.
Column 14 applies to Gueydan crude.
Column 6, Caddo, Homer, Haynesville, Bull Bayou, Crichton, De Soto, and El Dorado.
Texas Co., 5-21-41.
Column 6 applies to North Louisiana.
Columns 15 and 16, Bay St. Elaine, Caillou Island, Iberia, Lake Barre, Lake Pelto, Leesville, Port Barre. (Schedules A and B).
Column 17, Bateman Lake, Dog Lake, Fausse Point, Horseshoe Bayou, Jefferson Island, Plumb Bob, Vermilion Bay, West Cote Blanche, and Delta Duck Club.
Column 18, Delta Farm, Lake Salvador, Golden Meadow.
Allied Pipe Line Corp.
Column 2 applies to Pickens, Mississippi, 9-8-43.

LOUISIANA AND ARKANSAS FLAT PRICES

Continental Oil Co.:	
Tepetate and Lake Arthur, 5-21-41	$1.18
Ville Platte, 5-22-43	1.30
Bear, 5-15-43	1.30
Gulf Refining Co., 5-21-41:	
Smackover (Ark.)	$0.83
Lion Refining Co., 5-22-41:	
Smackover (heavy)	$0.83
Dorcheat	1.15
Phillips Petroleum Co., 5-22-41:	
Smackover (heavy)	$0.83
Placid Oil Co., 5-22-41:	
Tullos-Urania (5-21-41)	$1.15
Cotton Valley dist. (above 60°)	1.30
Cotton Valley (Holloway sand)	1.25
Cotton Valley (Bodcaw-D sands)	1.30
Pure Oil Co.:	
Bosco (5-21-41)	$1.14
Sweet Lake (5-22-41)	1.06
Creole (5-22-41)	1.16
Republic Oil Co., 6-2-41:	
Nevada County, Arkansas	$0.80
Republic Oil Refining Co., 5-21-41:	
Bayou Pigeon	$1.30
Shell Oil Co., Inc., 5-20-41:	
Happytown	$1.15
Standard Oil Co. of Louisiana, 5-22-41:	
Big Creek, Dorcheat, McKamie, Columbia, Macedonia (sour) (2-3-43)	$1.25
Smackover (heavy)	0.83
Cotton Valley distillate (9-1-41)	1.40
Cotton Valley (Holloway sand)	1.25
Lisbon distillate	$1.20
Texas Co., 5-21-41:	
Erath	$1.21
Garden Island	1.26
Lafitte, Paradis	1.19
Lake Mongoulois	1.26

MIDDLE WEST FLAT PRICES
Illinois and Indiana

Ohio Oil Co.:	
Illinois basin, 5-21-41	$1.37
Eastern Illinois, 5-21-41	$1.33
Western Indiana, 5-21-41	1.22
Magnolia Petroleum Co.:	
Illinois basin, 5-21-41	$1.37
Carter Oil Co.:	
Illinois (Louden), 5-21-41	$1.37
Sohio Corp.:	
Illinois basin, 5-21-41	$1.37

LOUISIANA, MISSISSIPPI AND SOUTHERN ARKANSAS GRAVITY TABLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 18	...	...	...	...	...	...	...	...	...	...	...	...	$.94	...	...	...	...	
18-18.9	...	...	...	...	...	...	...	...	...	...	...	...	.96	...	...	...	...	
19-19.9	...	...	...	...	...	...	...	...	...	...	...	...	.98	...	...	...	...	
Below 20	...	...	...	...	...	...	...	$1.06	...	$.94	$.99	$.89	...	...	$1.06	...	...	
20-20.9	...	...	...	...	...	...	...	1.08	...	.96	1.01	.91	1.00	...	1.08	...	...	
Below 21	$.68	...	...	$.90	...	...	...	...	...	...	...	...	...	$.90	...	...	...	
21-21.9	.70	...	...	.92	...	...	...	1.10	...	.98	1.03	.93	1.02	.92	1.10	...	...	
22-22.9	.72	...	...	.94	...	...	...	1.12	...	1.00	1.05	.95	1.05	.94	1.12	...	...	
23-23.9	.74	...	...	.97	...	...	...	1.14	...	1.02	1.07	.97	1.08	.96	1.14	...	...	
24-24.9	.76	...	...	.98	...	...	...	1.16	...	1.04	1.09	.99	1.11	.98	1.16	...	...	...
Below 25	...	$.86	$1.03	...	...	$.88	...	...	...	...	...	...	...	...	...	...	...	
25-25.9	.78	.88	1.05	1.00	...	.90	...	1.18	...	1.06	1.11	1.01	1.14	1.00	1.18	...	...	
26-26.9	.80	.90	1.07	1.02	...	.92	...	1.20	...	1.08	1.13	1.03	1.17	1.02	1.20	...	...	
27-27.9	.82	.92	1.09	1.04	...	.94	...	1.22	...	1.10	1.15	1.05	1.19	1.04	1.22	...	...	
28-28.9	.84	.94	1.11	1.06	...	.96	...	1.24	...	1.12	1.17	1.07	1.21	1.06	...	$1.14	$1.86	
29-29.9	.86	.96	1.13	1.08	...	.98	...	1.26	...	1.14	1.19	1.09	1.23	1.08	...	1.16	1.08	
30-30.9	.88	.98	1.15	1.10	$1.26	1.00	...	1.28	...	1.16	1.21	1.11	1.25	1.10	...	1.18	1.10	$1.05
31-31.9	.90	1.00	1.17	1.12	1.30	1.02	...	1.30	$1.07	1.18	1.23	1.13	1.27	1.12	...	1.20	1.12	1.07
32-32.9	.92	1.02	1.19	1.14	1.32	1.04	...	1.32	1.09	1.20	1.25	1.15	1.29	1.14	...	1.22	1.14	1.09
33-33.9	.94	1.04	1.21	1.16	1.34	1.06	...	1.34	1.11	1.22	1.27	1.17	1.31	1.16	...	1.24	1.16	1.11
34-34.9	.96	1.06	1.23	1.18	1.36	1.08	...	1.36	1.13	1.24	1.29	1.19	1.33	1.18	...	1.26	1.18	1.13
35-35.9	.98	1.08	1.25	1.20	1.38	1.10	...	...	1.15	...	...	...	...	1.20	...	1.28	1.20	1.15
Below 36	...	...	...	...	...	...	$1.07	...	...	...	...	...	...	...	...	...	...	...
36-36.9	1.00	1.10	1.27	1.22	1.40	1.12	1.09	...	1.17	...	...	...	...	1.22	...	1.30	1.22	1.17
37-37.9	1.02	1.12	1.29	1.24	1.42	1.14	1.11	...	1.19	...	...	...	...	...	...	...	...	1.19
38-38.9	1.04	1.14	1.31	1.26	1.44	1.16	1.13	...	1.21	...	...	...	...	...	...	...	...	1.21
39-39.9	1.06	1.16	1.33	1.28	1.46	1.18	1.15	...	1.23	...	...	...	...	...	...	...	...	1.23
40 and above	1.08	1.18	1.35	1.30	1.48	1.20	1.17	...	1.25	...	...	...	...	...	...	...	...	1.25

Texas Co.:
Illinois basin, 5-21-41 ..... $1.37
Gulf Refining Co.:
Illinois basin, 5-21-41 ..... $1.37

Michigan

Simrall Corp., 5-27-41:
Greendale, Porter, Vernon, Crystal, and Wise $1.44
Buckeye, Bentley, Edenville, Beaverton, and Monitor (sweet) 1.43
Freeman, Redding, Lincoln and Winterfield 1.39
Hamilton-Grout 1.39
West Branch-Arenac 1.34
Sohio Corp., 5-1-41:
Bloomingdale-Columbia $1.45
Mid-West Refineries, Inc., 5-1-41:
Kent County $1.38
Pure Oil Co., 5-27-41:
Sherman $1.39
Midland (Midland County) 1.44

SOUTH TEXAS AND SOUTHWEST TEXAS GRAVITY TABLES

	1	2	3	4	5	6	7
Below 20	$1.03	$1.08	$1.08	$.89	$1.03	$1.03	$1.08
20-20.9	1.05	1.10	1.10	.90	1.05	1.05	1.10
21-21.9	1.07	1.12	1.12	.91	1.07	1.07	1.12
22-22.9	1.09	1.14	1.14	.92	1.09	1.09	1.14
23-23.9	1.11	1.16	1.16	.93	1.11	1.11	1.16
24-24.9	1.13	1.18	1.18	.94	1.13	1.13	1.18
25-25.9	1.15	1.20	1.20	.95	1.15	1.15	1.20
26-26.9	1.17	1.22	1.22	.96	1.17	1.17	1.22
27-27.9	1.19	1.24	1.24	.97	....	1.19	1.24
28-28.9	1.21	1.26	1.26	.98	....	1.21	1.26
29-29.9	1.23	1.28	....	.99	....	....	1.28
30-30.9	1.25	1.30	....	1.00	....	....	1.30
31-31.9	1.27	1.32	....	1.01	....	....	1.32
32-32.9	1.29	1.34	....	1.02	....	....	1.34
33-33.9	1.31	1.36	....	1.03	....	....	1.36
34-34.9	1.33	1.38	....	1.04	....	....	1.38
35-35.9	1.35	1.40	....	1.05	....	....	1.40
36-36.9	1.37	1.42	....	1.06	....	....	....
37-37.9	1.39	1.44	....	1.07	....	....	....
38-38.9	1.41	1.46	....	1.08	....	....	....
39-39.9	1.43	1.48	....	1.09	....	....	....
40 and above	1.45	1.50	....	1.10	....	....	....

SOUTH TEXAS AND SOUTHWEST TEXAS TABLE EXPLANATION

Column 1 Mirando:
Humble Oil & Refining Co., 5-21-41, includes Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North and South), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manila, Mirando Valley, Placedo, Randado, Sarnosa, and Tesoro.
Magnolia Petroleum Co., 5-21-41.
Continental Oil Co., 7-1-41, includes Hoffman, Government Wells (North and South), Lopez, Moco, Colmena, Seven Sisters, South Seven Sisters, Loma Novia, Conoco, Driscoll, O'Hern, Piedra Lumbre, and Tarancahuas.
American Mineral Spirits Co., 5-21-41, includes Adami and Munson.
Republic Oil Refining Co., 5-21-41, includes Heyser field crude.

Column 2 Refugio:
Continental Oil Co., 7-1-41, includes Minnie Bock, Clara Driscoll, South Clara Driscoll, Driscoll Ranch, Orange Grove and Wade City.
Humble Oil & Refining Co., 5-21-41, includes East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth Saxet, Taft, and Tom O'Connor.
American Mineral Spirits Co., 5-21-41, includes Plymouth, Taft, and East White Point.

Column 3 Refugio:
Texas Co., 5-21-41, includes Greta, Saxet, and Taft.

Column 4 La Rosa:
American Mineral Spirits Co., 3-29-41.

Column 5 Duval-Mirando:
Sun Oil Co., 5-21-41.

Column 6 Duval-Mirando:
Texas Co., 5-21-41.

Column 7 Nueces County:
American Mineral Spirits Co., 5-21-41.
Republic Oil Refining Co., 5-21-41.

NORTH TEXAS, WEST CENTRAL TEXAS, EAST CENTRAL TEXAS GRAVITY TABLES

	1	2	3	4	5	6	7	8	9
Below 20	....	....	....	....	$0.80	....	....	....	$0.90
20-20.9	....	....	....	....	.82	....	....	....	.92
Below 21	....	....	....	....	....	$0.85	....	....	....
21-21.9	....	....	....	....	.84	.87	....	....	.94
22-22.9	....	....	....	....	.86	.89	....	....	.96
23-23.9	....	....	....	....	.88	.91	....	....	.98
24-24.9	....	....	....	....	.90	.93	....	....	.90
Below 25	....	....	$0.88	....	....	....	$0.89	$0.95	....
25-25.9	$0.95	....	.90	$0.97	.92	.95	.91	.97	.92
26-26.9	.97	....	.92	.99	....	.97	.93	.99	.92
27-27.9	.99	....	.94	1.01	....	.99	.95	1.01	.92
28-28.9	1.01	$1.01	.96	1.03	....	1.01	.97	1.03	.92
29-29.9	1.03	1.03	.98	1.05	....	1.03	.99	1.05	.92
30-30.9	1.05	1.05	1.00	1.07	....	1.05	1.01	1.07	.92
31-31.9	1.07	1.07	1.02	1.09	....	1.07	1.03	1.09	.92
32-32.9	1.09	1.09	1.04	1.11	....	1.09	1.05	1.11	.92
33-33.9	1.11	1.11	1.06	1.13	....	1.11	1.07	1.13	.92
34-34.9	1.13	1.13	1.08	1.15	....	1.13	1.09	1.15	.92
35-35.9	1.15	1.15	1.10	1.17	....	1.15	1.11	1.17	.92
36-36.9	1.17	1.17	1.12	1.19	....	1.17	1.13	1.19	.92
37-37.9	1.19	1.19	1.14	1.21	....	1.19	1.15	1.21	.92
38-38.9	1.21	1.21	1.16	1.23	....	1.21	1.17	1.23	.92
39-39.9	1.23	1.23	1.18	1.25	....	1.23	1.19	1.25	.92
40 and above	1.25	1.25	1.20	1.27	....	1.25	1.21	1.27	.92

NORTH TEXAS, WEST CENTRAL TEXAS, EAST CENTRAL TEXAS TABLE EXPLANATION

Column 1 West Central and North:
Humble Oil & Refining Co., 5-22-43, includes Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, and Throckmorton counties.
Panhandle Refining Co., 5-22-43, in Leuders area.
Gulf Refining Co., 5-22-43.
Sinclair Prairie Oil Marketing Co., 5-22-43.

Column 2 North Texas:
Continental Oil Co., 5-22-43.
Magnolia Petroleum Co., 5-22-43.
Panhandle Refining Co., 5-22-43.
Bell Oil & Gas Co., 5-22-43.
Texas Co., 5-22-43.

Column 3 East Central:
Magnolia Petroleum Co., 5-21-41, includes Cass, Panola, and Rodessa (Texas and Louisiana), and Miller County, Arkansas.
Gulf Refining Co., 5-21-41, includes Rodessa, Texas.

Column 4 East Central:
Humble Oil & Refining Co., 5-21-41, includes Anderson, Cherokee, Limestone, and Navarro counties and the Navarro Crossing field.

Column 5 East Central:
Humble Oil & Refining Co., 5-21-41, includes Hawkins field.

Column 6 North Texas:
Stanolind Oil Purchasing Co., 5-22-43.

Column 7 Fisher County:
Shell Oil Co., Inc., 12-11-41.

Column 8 Mexia:
Sinclair Prairie Oil Marketing Co., 5-30-41.

Column 9 Talco:
Magnolia Petroleum Co., 5-28-43.
Humble Oil & Refining Co., 5-28-43.

TEXAS GULF COAST GRAVITY TABLES

	(1)	(2)	(3)	(4)	(5)
Below 20	$1.06	$1.06	....	$0.96	$0.93
20-20.9	1.08	1.08	....	1.00	.95
Below 21	....	....	$1.08	....	....
21-21.9	1.10	1.10	1.10	1.02	.97
22-22.9	1.12	1.12	1.12	1.04	.99
23-23.9	1.14	1.14	1.14	1.06	1.01
24-24.9	1.16	1.16	1.16	1.08	1.03
25-25.9	1.18	1.18	1.18	1.10	1.05
26-26.9	1.20	1.20	1.20	1.12	1.07
27-27.9	1.22	1.22	1.22	1.14	1.09
28-28.9	1.24	1.24	1.24	1.16	1.11
29-29.9	1.26	1.26	1.26	1.18	1.13
30-30.9	1.28	1.28	1.28	1.20	1.15
31-31.9	1.30	1.30	1.30	1.22	1.17
32-32.9	1.32	1.32	1.32	1.24	1.19
33-33.9	1.34	1.34	1.34	1.26	1.21
34-34.9	1.36	1.36	1.36	1.28	1.23
35-35.9	1.38	....	1.38	1.30	1.25
36-36.9	1.40	....	1.40	1.32	1.27
37-37.9	1.42	....	1.42	1.34	1.29
38-38.9	1.44	....	1.44	1.36	1.31
39-39.9	1.46	....	1.46	1.38	1.33
40 and above	1.48	....	1.48	1.40	1.35

TEXAS GULF COAST GRAVITY TABLE EXPLANATION

Column 1:
Humble Oil & Refining Co., 5-21-41, includes Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa (new), Raccoon Bend, South Thompson, Sugarland, Thompson, and Webster fields.
Stanolind Oil & Gas Co., 5-21-41, includes West Beaument, High Island, and Spindletop.
Sinclair Prairie Oil Marketing Co., 5-21-41.
Stanolind Oil Purchasing Co., 4-9-42, includes Clinton and Lake Creek.
Pure Oil Co., 4-21-41, includes Louise and Ganado.
Gulf Refining Co., 5-21-41, includes Spindletop, Sour Lake, Lovells Lake, West Beaumont, Goose Creek, South Liberty, Big Creek, Blue Ridge, Fannett, Moore, Barbers Hill, Hankamer, Thompson, Lochridge, Dyersdale, and Hull (old).
Sun Oil Co., 5-21-41, includes Barbers Hill, Batson (old), Bayou Blue, Chacahoula, Cotton Lake, Experson (below 35° gravity), Fausse Point, Goose Creek, Greens Lake, Hackberry (east and west), Hull (below 25°), Humble (below 35°), Nome, North Dayton (below 35°), Orange, Saratoga, Sour Lake, South Liberty, and Vinton.
Column 2:
Texas Co., 5-21-41, includes Arriola, Ganado, Hamman, Hillje, Humble, Kubela, Magnet, Manvel, Markham, Mauritz, Old Ocean, Pickett Ridge, Port Neches, Sour Lake, West Columbia, and Withers.
Column 3:
Pan American Production Co., 5-21-41, includes Hastings and South Houston.
Stanolind Oil & Gas Co., 4-1-41, includes High Island, Spindletop, Hastings, and South Houston.
Column 4:
Humble Oil & Refining Co., 5-21-41, includes Anahuac, Angleton, Cedar Point, Fishers' Reef, Hull (new and old), Pierce Junction, Red Fish Reef, and Turtle Bay.
Gulf Refining Co., 5-21-41, includes Anahuac, Hull (new), Thompson (deep), Pierce Junction, and Orange.
Sun Oil Co., 5-21-41, includes Anahuac, Caplen and Turtle Bay.
Humble Oil & Refining Co., 3-29-41, includes Dickinson, Gillock, Hardin, League City, and Rowan.
Pure Oil Co., 2-23-43, at Alief field.
Column 5:
Pan American Production Co., 5-21-41, includes Gillock, except scale starts at 95 cents below 21°.
Stanolind Oil Purchasing Co., 5-21-41, includes Fairbanks, North Houston, and Roslyn.

TEXAS FLAT-PRICE FIELDS

Agua Dulce (light), Benavides, Longhorn, Southland, and Sweden, 5-21-41 ..... $1.35
Agua Dulce (heavy), 10-16-41 ..... $1.25
Republic Oil Refining Co., 5-21-41.
Alfred and Magnolia City $1.35
Continental Oil Co., 5-21-41.
Alice, Benavides (North Sweden), Ben Bolt, Clark-Muil, Sun, and Tom Graham $1.35
Humble Oil & Refining Co., 5-21-41.
Batson (new), Humble (35° and above) Fig Ridge, Hardin, Hull (25° and above), La Belle, North Dayton (25° and above), Seabreeze South China, West Orange, Willow Slough and Oyster Bayou $1.25
Sun Oil Co., 5-21-41.
Cass County $1.20
Texas Co., 5-21-41.
Cayuga, Anderson County $0.90
Pan American Production Co., 5-21-41.

Chapel Hill, Smith County:
Crude distillate $1.30
Crude oil 1.18
Chapel Hill Gas System, 11-7-41.

Clay Creek, Washington County $1.00
Sun Oil Co., 5-21-41.

Cleveland, Liberty County $1.26
Magnolia Petroleum Co., 5-21-41.

Conroe, Montgomery County $1.43
Humble Oil & Refining Co., 5-21-41.
Tide Water Associated Oil Co., 5-21-41.
Sun Oil Co., 5-21-41.
Texas Co., 5-21-41.

Cotton Lake (South) $1.35
Sun Oil Co., 5-21-41.

East Texas and Flag Lake* $1.25
*Humble Oil & Refining Co., 5-21-41.
Pan American Production Co., 5-21-41.
Tide Water Associated Oil Co., 5-21-41.
Gulf Refining Co., 5-21-41.
Magnolia Petroleum Co., 5-21-41.
Sinclair Prairie Oil Marketing, 5-21-41.
Shell Oil Co., Inc., 5-20-41.
Sun Oil Co., 5-21-41.
Texas Co., 5-21-41.
Stanolind Oil Purchasing Co.

Esperson (35° and above), South Esperson $1.30
Sun Oil Co., 5-21-41.

Flour Bluff, East Flour Bluff $1.33
Humble Oil & Refining Co., 5-21-41.

Hockley and Cochran $0.87
Texas Co., 5-21-41.

Livingston and Mercy $1.25
Shell Oil Co., Inc., 5-20-41.

Long Lake $1.23
Sinclair Prairie Oil Marketing, 5-21-41.

Luby $1.35
American Mineral Spirits Co., 5-21-41.

Luling $1.05
Magnolia Petroleum Co., 5-21-41.

Lytton Springs $1.17
Magnolia Petroleum Co., 5-21-41.

Salt Flat, North Salt Flat, Darst Creek*, Hilbig, Clark, Carroll and Zoborski $1.41
Humble Oil & Refining Co., 5-21-41.
Magnolia Petroleum Co., 5-21-41.
*Texas Co., 5-21-41.

Rincon (North), Sun, North Sun and Garcia $1.35
Sun Oil Co., 5-21-41.

Yturria $1.45
Sun Oil Co., 3-19-42.

Talco $0.79
Humble Oil & Refining Co., 5-21-41.
Magnolia Petroleum Co., 5-21-41.

Tomball and Satsuma $1.40
Humble Oil & Refining Co., 5-21-41.
*Magnolia Petroleum Co., 5-21-41.
Stanolind Oil Purchasing Co., 4-1-41.

Van, Van Zandt County $1.08
Humble Oil & Refining Co., 5-21-41.
Pure Oil Co., 5-21-41.

Yates (regular) $0.95
Humble Oil & Refining Co., 5-21-41.
Gulf Refining Co., 5-21-41.
Shell Oil Co., Inc., 5-20-41.

Yates (shallow) $0.82
Shell Oil Co., Inc., 5-20-41.

WEST TEXAS, PANHANDLE, AND NEW MEXICO GRAVITY TABLES

	1	2	3	4	5	6	7	8	9	10	11
Below 20	$0.70	....	....	....	....	....	....	....	$0.70	$0.80	....
20-20.9	.72	....	....	....	....	....	....	....	.72	.82	....
21-21.9	.74	....	....	....	....	....	....	....	.74	.84	....
22-22.9	.76	....	....	....	....	....	....	....	.76	.86	....
23-23.9	.78	....	$0.78	....	....	....	....	....	.78	.88	....
24-24.9	.80	....	.80	....	....	....	....	....	.80	.90	....
Below 25	....	$0.80	....	....	....	....	$0.80	....	....	....	$0.90
25-25.9	.82	.82	.82	....	$0.82	....	.82	....	.82	.92	.92
26-26.9	.84	.84	.84	....	.84	....	.84	....	.84	.94	.94
27-27.9	.86	.86	.86	....	.86	....	.86	....	.86	.96	.96
28-28.9	.88	.88	.88	$0.98	.88	....	.88	$0.88	.88	.98	.98
29-29.9	.90	.90	.90	1.00	.90	....	.90	.90	.90	1.00	1.00
30-30.9	.92	.92	.92	1.02	.92	....	.92	.92	.92	1.02	1.02
31-31.9	.94	.94	.94	1.04	.94	....	.94	.94	.94	1.04	1.04
32-32.9	.96	.96	.96	1.06	.96	....	.96	.96	.96	1.06	1.06
33-33.9	.98	.98	.98	1.08	.98	....	.98	.98	.98	1.08	1.08
34-34.9	1.00	1.00	1.00	1.10	1.00	1.10	1.00	1.00	1.00	1.10	1.10
35-35.9	1.02	1.02	1.02	1.12	1.02	1.12	1.02	1.02	1.02	1.12	1.12
36-36.9	1.04	1.04	1.04	1.14	1.04	1.14	1.04	1.04	1.04	1.14	1.14
37-37.9	1.06	1.06	....	1.16	1.06	1.16	....	1.06	....	1.16	1.16
38-38.9	1.08	1.08	....	1.18	1.08	1.18	....	1.08	....	1.18	1.18
39-39.9	1.10	1.10	....	1.20	1.10	1.20	....	1.10	....	1.20	1.20
40 and above	1.12	1.12	....	1.22	1.12	1.22	....	1.12	....	1.22	1.22

WEST TEXAS, PANHANDLE AND NEW MEXICO TABLE EXPLANATION

Column 1:
Humble Oil & Refining Co., 5-21-41, includes Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard, Reagan, Upton, Winkler, and Yoakum counties, West Texas, and Lea County, New Mexico.
Gulf Refining Co., 5-21-41, includes Crane, Ector, Upton, Ward, and Winkler counties, West Texas.
Stanolind Oil Purchasing Co., 5-1-43, at Slaughter and Cedar Lake.

Column 2:
Sinclair Prairie Oil Marketing Co., 5-21-41, includes West Texas and Lea County, New Mexico. Effective 5-29-41, in Eddy County, New Mexico.
Magnolia Petroleum Co., 5-21-41, includes Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum and Gaines counties.

Column 3:
Texas Co., 5-21-41, includes Crane and Winkler counties, Texas, and Lea County, New Mexico.

Column 4 Texas Panhandle:
Magnolia Petroleum Co., 6-16-43.
Continental Oil Co., 6-16-43.*
Phillips Petroleum Co., 6-16-43.*
*Starts at $1 for 29-29.9.

Column 5 Winkler and Lea:
Stanolind Oil & Gas Co., 5-21-41, includes Winkler County only.
Gulf Refining Co., 5-21-41, includes Lea County, New Mexico, only.

Column 6 Gray County:
Texas Co., 6-16-43.
H. F. Wilcox Oil & Gas Co., 6-16-43.

Column 7 Lea County:
Magnolia Petroleum Co., 5-21-41.

Column 8 Eddy County:
Continental Oil Co., 5-30-41.

Column 9:
Shell Oil Co., Inc., 5-20-41, includes Crane Ector, Howard, Glasscock, Upton, Winkler, and Yoakum counties, Texas, and Lea County, New Mexico.

Column 10 Texas Panhandle:
Humble Oil & Refining Co., 6-16-43.
Gulf Refining Co., 6-16-43.

Column 11 Panhandle:
Sinclair Prairie Oil Marketing Co. 6-16-43

CANADIAN FIELDS

Imperial Oil, Ltd.:
Petrolia, 11-6-39 ..... $2.10
Oil Springs, 11-6-39 ..... 2.07
Bothwell, 11-6-39 ..... 2.10
Turner Valley, 7-16-41 ..... $1.35-1.97

EASTERN STATES

Pennsylvania and Ohio

South Penn Oil Co.:
National lines, 3-26-42 ..... $3.00
Southwest Penn, 3-26-42 ..... 2.88
Eureka lines, 3-26-42 ..... 2.50
Corning grade, 5-27-41 ..... 1.31

Tide Water Associated Oil Co.:
Bradford, 3-26-42 ..... $3.00
Allegany, N. Y., 3-26-42 ..... 3.00

Pennzoil Co.:
Group A, 3-26-42 ..... $2.93
Group B, 3-26-42 ..... 2.93
Group C, 3-26-42 ..... 2.91
Group D, 3-26-42 ..... 2.90
Group E, 3-26-42 ..... 2.80

Quaker State Oil Refining Corp.:
In Buckeye lines, 3-26-42 ..... $2.50
In Eureka lines, 3-26-42 ..... 2.80

Kentucky

Ashland Oil & Transportation Co., 6-19-41:
Big Sandy River (8-9-43) $1.43
Kentucky River (6-19-41) 1.43

Sohio Corp., 5-21-41:
Birk City $1.33

Western Kentucky

All purchasers, 8-9-43:
Henderson, Webster, McLean, Daviess Union and Muhlenberg counties $1.37

STANDARD OIL CO. OF CALIFORNIA CRUDE-OIL PRICES EFFECTIVE APRIL 1, 1943

Gravity	Signal Hill (Long Beach)	Wilmington	Seal Beach	Huntington Beach	Inglewood	Olinda-Brea Canyon	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills Midway-Sunset, Lakeview area	Coalinga	Kettleman Hills	Elwood Terrace
14-14.9	....	$0.93	....	$0.96	....	$0.95	$0.95	$0.95	$0.95	$0.97	....	....	....	....	....	$0.98	$0.98	....	....
15-15.9	....	.96	....	1.00	$1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
16-16.9	....	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
17-17.9	....	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
18-18.9	$0.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
19-19.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	$0.98	.98	.98	....	....
20-20.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
21-21.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
22-22.9	.96	.96	$0.88	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
23-23.9	1.00	1.03	.92	1.02	1.01	.98	.97	.98	1.00	.97	....	....	....	....	.98	.99	.98	....	....
24-24.9	1.03	1.06	.97	1.05	1.04	1.01	1.01	1.02	1.03	.97	$0.99	....	....	....	.98	1.03	.98	....	....
25-25.9	1.07	1.09	1.01	1.08	1.07	1.04	1.05	1.06	1.07	.98	1.02	....	....	....	.98	1.07	.98	....	....
26-26.9	1.11	1.12	1.06	1.11	1.10	1.08	1.09	1.10	1.11	1.01	1.06	....	....	....	.98	1.11	.98	....	....
27-27.9	1.15	1.15	1.10	1.14	1.14	1.11	1.13	....	1.15	1.05	1.10	$1.04	....	....	1.01	1.15	.98	....	....
28-28.9	1.18	1.18	1.15	1.17	1.17	1.14	1.17	....	....	1.08	1.13	1.08	....	....	1.04	1.19	1.00	....	....
29-29.9	1.20	1.21	1.19	1.20	1.20	....	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.02	....	....
30-30.9	1.23	1.24	....	1.23	1.22	....	....	....	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.04	....	f.o.b.
31-31.9	....	....	....	....	1.24	....	....	....	....	1.19	1.24	1.19	1.04	1.12	1.14	....	1.06	....	ship
32-32.9	....	....	....	....	....	....	....	....	....	1.23	1.28	1.23	1.07	1.14	1.17	....	1.09	....	....
33-33.9	....	....	....	....	....	....	....	....	....	1.27	....	1.26	1.10	1.17	....	....	1.11	....	$1.22
34-34.9	....	....	....	....	....	....	....	....	....	1.31	....	1.30	1.13	1.20	....	....	1.13	....	1.25
35-35.9	....	....	....	....	....	....	....	....	....	1.35	....	....	1.16	1.22	....	....	....	$1.22	1.28
36-36.9	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	1.26	....
37-37.9	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	1.29	....
38-38.9	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	....
39-39.9	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	....
40-40.9	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	....

Standard posts 94 cents for 12 gravity and 96 cents for 13 gravity in San Joaquin fields, effective May 25, 1943.

Butler County	1.32
Bowling Green area	1.17

West Virginia

Pure Oil Co.:

Cabin and Kelly Creek, 3-27-43	$3.00

ROCKY MOUNTAIN GRAVITY TABLE

Below 29	$0.96
29-29.9	.98
30-30.9	1.00
31-31.9	1.02
32-32.9	1.04
33-33.9	1.06
34-34.9	1.08
35-35.9	1.10
36-36.9	1.12
37-37.9	1.14
38-38.9	1.16
39-39.9	1.18
40 and above	1.20

Stanolind Oil & Gas Co., 5-20-41, includes Dutton Creek, Midway, and Salt Creek except Tensleep crude, Wyoming.

Sinclair-Wyoming Oil Co., 5-20-41, includes Salt Creek and Lost Soldier, except Tensleep crude, Wyoming.

Continental Oil Co., 5-21-41, includes Fort Collins and Wellington, Colorado

Wyoming

Ohio Oil Co.:	
Rock River (5-20-41)	$1.10
Lance Creek (7-1-41)	1.13
Elk Basin and Grass Creek (light)	1.00
Elk Basin (heavy) (4-28-43)	.90
Grass Creek (heavy) (4-1-43)	.85
Stanolind Oil & Gas Co.:	
Frannie (light) (4-1-43)	$0.85
Frannie (heavy) (4-1-43)	.82
Grass Creek (light) (5-20-41)	1.00
Grass Creek (heavy) (4-1-43)	.85
Elk basin (5-20-41)	1.00
Salt Creek (Tensleep) (4-28-43)	.90
Continental Oil Co.:	
Big Muddy (5-20-41)	$1.08
Lance Creek (9-1-41)	1.13

Montana

Continental Oil Co., 4-1-41:	
Cat Creek	$1.15

Colorado

Stanolind Oil & Gas Co., 5-20-41:	
Iles	$1.07
Continental Oil Co., 5-21-41:	
Canon City-Florence	$1.06

MISSISSIPPI

Flora Field Discovery Completed as Pumper

JACKSON, Miss.—Love Petroleum Co. completed its Flora field discovery well, 2-8n-1w, in Madison County, as a small pumper. With total depth of 4,367 ft., 5½-in. casing set to 4,337 ft. and completed in lime pay at 4,357-67 ft., the well pumped 75 bbl. of net oil per day, plus 100 bbl. of salt water.

In Adams County, California Co. is testing the 1 Ella G. Lees, 52-7n-1w, Cranfield field, at 4,400-ft. level, after drilling to 5,887 ft. in shale and then setting 7-in. casing at 4,445 ft.

Humble Oil & Refining Co. 1 I. A. Hurst, deep test in 33-5s-8w, Greene County, is drilling below 11,610 ft. in shale.

MISSISSIPPI WILDCAT COMPLETIONS

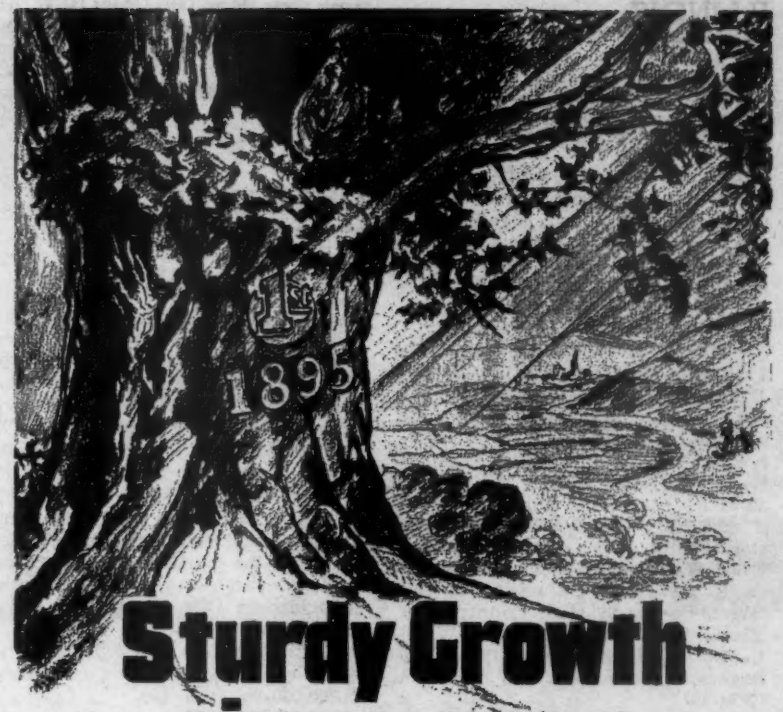
Attala County: Hunt Oil Co. 1 D. J. Murphy, 4-16s-6e, dry at 5,740 ft.

Copiah County: Freeport Sulphur Co. 2 Cecil Bell, 30-10n-9e, dry at 2,025 ft.

Madison County: Union Producing Co. 1 Murphy, 3-8n-1w, Flora area, dry at 6,212 ft.

Love Petroleum 2 John Anderson, 2-8n-1w, Flora field discovery well, T.D. 4,367 ft., 5½ in. at 4,357, pay at 4,357-67 ft., pumping 75 bbl. oil, plus 100 bbl. water.

Love Petroleum 2 Rowland, 35-9n-1w Flora area, dry at 4,378½ ft.



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ILLINOIS

Completions Are Exceeded By New Field Operations

CENTRALIA, Ill.—Only 20 new wells were reported from Illinois fields during the week, together with 8 dry holes. New operations exceeded completions by 11. The 31 new starts included 10 wildcats as follows: In Edwards County, Texas Co. 1 Pampe-Sager Community, approximately C S½ NE SW 34-2s-10e, and Humphries 1 Crackel-Franklin, C S½ SW NW 32-2s-10e; Wayne County, Roy Powers 1 Murphy, NW NW NW 18-1n-6e, and Felix Jablonski 1 Yorndorf, C NW NW 3-1n-9e; Franklin County, George Allison 1 Shirley, NE NE NE 29-5s-3e, and Aetna Oil Co. 1 U. S. C. & C. Co., SE SE NW 8-6s-4e; Marion County, Jarvis et al 1 F. Gabriel, NW NW SE 28-3n-3e; Madison County, L. Lawrence 1 Bassett, NW NE NW 23-6n-9w; St. Clair County, E. A. Morris 1 Alberts, SW NW NW 16-1s-9w; Washington County, R. O. Rogerson 1 Schubert, SW NW NW 18-3s-4w.

The largest new producer of the week was Pure Oil Co.'s 1 G. A. Flexter-A, SE NE SW 34-2n-7e, which pumped 471 bbl. in 24 hours from Aux Vases sand topped at 2,955 ft., total depth 2,980 ft. The sand was not shot.

(Continued on page 114)

OKLAHOMA

Gas Prevents a Complete Test at Mid-Continent Well

THE Mid-Continent Petroleum Corp. 1 Harris, Cleveland County discovery in the second Wilcox sand, made a flow of 238 bbl. of oil in 3 hours through ⅞-in. choke on the tubing. Because of high gas pressure it has been impossible to let the well flow to clean itself and some sand is being produced with the oil. Because of the cutting action of the sand, comparable to that experienced at Oklahoma City in its flush days, the well was pinched to ⅛-in. before being shut in. Gas gaged through the ⅛-in. choke was a little less than 18,000,000 cu. ft. a day.

(Continued on page 114)

OHIO, KENTUCKY

Zanesville Wildcat Opens New Gas Area in Clinton

ZANESVILLE, Ohio.—A discovery well drilled by Atha Realty Co., 1 mile south of Zanesville indicates a new gas pool for this area. The well, on the Adolph Woerner tract in Section 7, Wayne Township, Muskingum County, was drilled 12 ft. in the Clinton sand, and gaged 1,700,000 cu. ft. of gas with 1,155 lb. pressure. Drilling was stopped at 3,732 ft. The well will be drilled through the sand later as oil is expected in the bottom of the pay. The pool will be developed by Atha and the Ohio Fuel Gas Co.

A wildcat completed by the Ohio Fuel Gas Co., 2 miles southeast of the Carlisle pool, found 235,000 cu. ft. of gas in the Clinton sand at 2,421-23 ft. The well is on the Schneider tract in Lot 98, Eaton Township, Lorain County. An offset to the well will be drilled to further test the area.

The Wheeling Oriskany pool had a good completion by Ohio Fuel on the

(Continued on page 114)

Wildcat Completions and Discoveries

OF the eight new discoveries completed last week, four were above the present average. The largest well, and also one of the best for Oklahoma this year, was a Viola discovery in Pottawatomie County. The well is Watchorn Oil & Gas Co. 1 Sorrell in 20-6n-3e, about 2 miles west of the old Asher pools where production is also found in the Viola, Simpson and shallower sands. Flowing through choke, it made as high as 237 bbl. in 1 hour and completed at 629 bbl. a day through ⅛-in. choke. Top of the pay was 4,140 ft.

In Iberville Parish, South Louisiana, the Rosedale field was opened in 74-7s-10e. The well flowed 215 bbl. of 34.6-gravity oil through perforations at 10,009 ft. In Terrebonne Parish, Falcon-Seaboard et al extended the Gibson pool 1 mile with a 225-bbl. well.

A large gas-distillate well was completed in Panola County, East Texas, flowing 191,000.000 cu. ft. of gas from the upper and lower Pettit lime zones.

WILDCAT COMPLETIONS

	Week ended November 20, 1943					Cumulative total for 1943				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	2	0	2	4	0	23	52	79
Indiana	0	0	0	0	0	4	0	0	52	56
Kentucky	0	0	0	0	0	20	0	2	108	131
Illinois	1	0	0	4	5	68	0	3	362	433
Michigan	0	0	0	9	9	11	0	2	149	162
Kansas	1	0	0	9	10	55	0	1	332	388
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	24	24
Oklahoma	1	0	0	3	4	40	1	17	237	295
Texas:										
North Central	0	0	0	7	7	51	0	1	321	373
West	1	0	0	0	1	12	0	1	75	88
Panhandle	0	0	0	0	0	0	0	0	6	6
East	0	1	0	3	4	5	1	2	91	99
Gulf Coast	0	0	0	5	5	6	7	6	114	133
Southwest	0	0	0	6	6	21	11	4	244	280
Total	1	1	0	21	23	95	19	14	851	979
Louisiana:										
North	0	0	0	1	1	6	0	4	65	75
Gulf Coast	2	0	0	0	2	14	7	1	28	50
Total	2	0	0	1	3	20	7	5	93	125
Arkansas	0	0	0	2	2	2	0	0	59	61
Mississippi and Southeast	1	0	0	5	6	6	0	0	63	69
Montana	1	0	0	0	1	6	0	3	23	32
Wyoming	0	0	0	0	0	6	0	0	15	21
Colorado, Utah	0	0	0	0	0	0	0	1	5	6
New Mexico	0	0	0	1	1	5	0	2	23	30
California	0	0	0	4	4	7	0	9	128	144
Total United States	8	1	2	59	70	349	27	82	2,576	3,034
Total previous week	9	0	4	68	81					

Summary of October Drilling Operations

A SLIGHT increase in the weekly average completion rate was registered in October when a total of 1,636 wells in the United States were finished. The month's total compares with 1,827 completions in September which covered field reports for 5 weeks rather than 4 weeks embraced in the October record.

Out of the 1,636 completions in October, 286 were wildcats (see p. 100), leaving 1,350 development wells. The ratio of 5 development-well completions to each wildcat in October compares with a relation of 7 to 1 in September.

There were no pronounced changes in the trend of drilling by areas reflected in the October completion report with the possible exception of shifts in the centers of activity in Texas. Declines were shown in the Gulf Coast area with offsetting rises, percentagewise, in West Texas and North Texas.

The accelerated rate of completions in California was maintained in October when 127 wells were finished, compared to 128 in the previous month.

Comparative figures for October 1942 are 1,451 completions, consisting of 830 oil wells, 172 gas producers and 449 dry holes. The increased percentage of oil wells this year probably results from the closer spacing of development wells in several districts where blanket exceptions have been granted to PAO 11.

Active drilling operations totaled 2,756 at the end of October, an increase of more than 20 per cent compared to the same time in 1942 when 2,242 rigs and drilling wells were reported.

Wells completed below 10,000 ft. in October were nearly double the previous month's operations in this category. Not since May 1942, has the industry completed as many 10,000-ft. wells as last month.

SUMMARY OF OPERATIONS, OCTOBER 1943

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 (ft.)	1,000-2,500 (ft.)	2,500-5,000 (ft.)	5,000-10,000 (ft.)	Over 10,000 (ft.)	Footage	Rigs and drilling
Appalachian	*257	165	305	70	22	2	40	209	6	0	496,408	298
Ohio	88	15	402	42	31	11	25	51	1	0	224,889	198
Indiana	19	9	802	1	9	6	8	5	0	0	35,916	45
Kentucky	75	23	5,068	23	29	11	40	24	0	0	141,583	144
Michigan	54	11	6,250	1	42	0	12	38	4	0	146,566	109
Illinois	199	122	22,062	2	75	7	73	119	0	0	521,183	190
Kansas	139	68	22,805	2	69	2	14	121	2	0	452,544	258
Nebraska	2	1	115	0	1	0	1	1	0	0	5,610	4
Missouri, Iowa	5	0	0	0	5	4	1	0	0	0	4,594	3
Oklahoma	62	31	9,536	7	24	3	18	28	13	0	216,646	347
North Texas	121	65	13,116	0	56	17	51	28	25	0	359,708	72
West Central Texas	44	25	29,706	0	19	6	25	13	0	0	97,842	13
West Texas	99	90	45,349	0	9	0	14	67	18	0	441,594	98
Texas Panhandle	17	16	2,133	1	0	0	0	17	0	0	57,507	12
East Texas	28	16	5,677	2	10	1	10	15	2	0	166,367	48
Upper Gulf Coast	43	21	4,627	1	21	0	1	5	33	4	286,442	89
Lower Gulf Coast	45	24	4,446	4	17	0	0	9	36	0	270,558	84
South Central Texas	5	1	259	0	4	0	2	2	1	0	19,262	16
South Texas	26	14	1,816	2	10	0	2	17	6	1	125,853	48
Total Texas	428	272	107,129	10	146	24	105	173	121	5	1,825,133	478
Southeast New Mexico	26	22	2,821	0	4	2	5	19	0	0	67,801	53
Arkansas	32	15	2,414	4	13	0	7	14	10	1	149,412	48
North Louisiana	29	13	1,331	3	13	1	11	8	9	0	107,414	51
Louisiana Gulf	27	15	2,816	4	8	0	2	0	10	15	248,321	83
Mississippi	14	4	819	0	10	0	1	2	9	2	101,755	22
Montana	35	19	1,439	2	14	0	21	14	0	0	78,567	84
Wyoming	14	11	8,316	0	3	2	1	8	3	0	53,594	110
Colorado, Utah	3	0	0	0	3	0	1	2	0	0	9,663	27
Northwest New Mexico	1	0	0	1	0	0	0	1	0	0	3,345	11
California	127	107	15,001	3	17	7	45	50	23	2	421,753	193
Total October	1,636	923	209,431	175	538	82	431	887	211	25	5,312,717	2,756
Total September	1,827	958	184,550	194	675	93	651	763	307	13	5,974,565	2,722

*Does not include 132 input wells.

LA.-ARK.

Third Producer at Holly Ridge Nearing Completion

SHREVEPORT, La.—In the Holly Ridge pool of Tensas Parish, Carter Oil Co. was ready to complete at its 2 Shelley, a west offset to the discovery. Production tests had not been made on last report but 40 shots were made at 8,435-45 ft. Total depth is 8,454 ft. It will be the third well in the field. Work is progressing on the north offset. The company's 1 H. M. Marks, NW NE 19-11n-10e, was building derrick. Union Producing Co. is rigging up its 2 Penrod-Jorden in NW NW 19-11n-10e, ¾ mile to the northwest.

NORTH LOUISIANA WILDCAT COMPLETION

Bossier Parish: W. K. Rowe et al 1 Antrim, SE SE 22-22n-13w, dry, T.D. 3,090 ft.

ARKANSAS WILDCAT COMPLETIONS

Calhoun County: Lion Oil Ref. 1 Anthony, NW NW NW 13-13s-16w, dry, T.D. 3,097 ft.

Ouachita County: S. J. Carnes 1 Camden Coal & Clay Co., SW SW NE 11-12s-18w, dry, T.D. 3,200 ft.

KANSAS

Salina Basin Discovery Is in Viola Lime

WHAT appears to be the biggest strike in the Salina basin, Margay Oil Corp. 1 Anderson, NW SW 3-16-3w, just north of the abandoned Olson field, was slopping over the top after filling the hole in 6 hours. The well was plugged back to test the Viola lime after drilling to 3,505 ft. and finding water in the Simpson. Perforations through which the hole filled with oil were made at 3,363-67 ft. Location is about 10 miles south and west of Salina.

KANSAS WILDCAT COMPLETIONS

Barber County: Shell 1 Hull, SW SW SE 12-30-12w, dry, T.D. 4,865 ft., Viola 4,593 ft., Arbuckle 4,792 ft.

Cowley County: National Association Pet. 1 Billiter, W½ SW SE 16-30-3e, dry, T.D. 3,398 ft., Bartlesville 2,925 ft., Mississippi lime 2,941 ft., Arbuckle 3,385 ft.

Dickinson County: Appleman and National Ref. 1 Shockley, NE NE SE 18-14-1e, dry, T.D. 2,485 ft., Kansas City 1,822 ft., Mississippi lime 2,443 ft.

Ellis County: Coralena Oil 1 Foster, NE NW SW 1-15-16w, dry, T.D. 3,481 ft., Kansas City 3,173 ft., Arbuckle 3,456 ft.

(Continued on page 114)

WEIGHT INDICATOR POINTS

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RECTORSEAL

Among the Drilling Contractors

Gene Reid Drilling Co., Long Beach, Calif., is completing a new well for Pacific Western Oil Co. in the Poso-Kern Front district of California and will drill a second well as soon as the rig is freed.

H. O. Grace, Wichita Falls, Tex., has contract to drill a 6,500-ft. wildcat for Premier Oil Refining Co. and Joe Humphrey. Location is 1 Fred Wines, 2 miles east of Joy, 467 ft. from the south and west lines of Block 5, J. Hand Survey, Clay County, Texas.

Penrod Drilling Co., Houston, Tex., has contract to drill a 10,000-ft. wildcat test for Placid Oil Co. on Tremont Lumber Co. property in La Salle Parish, Louisiana, NE SW 14-9n-2e.

P. H. Frank, Inc., Long Beach, a newcomer among California drilling contractors, is rigging up rotary for a wildcat which will be drilled for Shell Oil Co., Inc., in Los Banos district of Merced County.

T. J. Conway, Kilgore, Tex., is to drill a 5,500-ft. wildcat test for B. A. Skipper of Longview, 660 ft. from the north and east lines of a 160-acre tract in Martin Lacy Survey, 1½ miles west of Alto, in southern Cherokee County, Texas, on the M. E. McClure farm.

J. A. Aylward, Great Bend, Kans., has contracted to drill 1 Bayer, NE NE SW 29-19-10w, ½ mile north of the Silica field in western Rice County, Kansas, for the account of Nadel & Gussman.

Helmerich & Payne, Inc., Tulsa, will drill a wildcat test for Nadel & Gussman in the southwestern part of Rooks County, Kansas, 10 miles southeast of the Norel field on the Powell farm, SE SW SE 36-9-20w.

Mac Drilling Co. (Cap McDannald), Houston, Tex., is preparing to spud Amerada Petroleum Corp. 1 J. F. Wood, a wildcat in Marcia de Jesus Ybarbo Survey, A-446, 3 miles west of the Slick-Wilson field in Karnes County. This is a 10,000-ft. Wilcox test.

G. C. English, of Cement, Okla., has been awarded the drilling contract on the Anderson-Prichard and Caddo Oil 1 Robinson, NE SE SE 1-5n-10w, Caddo County, Oklahoma. Same company was rigging up at the 5 L. L. Edwards, SW NE NW 1-5n-10w.

Kern Drilling Co., Long Beach, Calif., recently completed a new gas well for Standard Oil Co. on the Gough lease in the El Segundo field of Los Angeles Basin and has been awarded the contract for another well which will also be finished in the gas zone.

Cross Drilling Co., Odessa, Tex., is drilling a wildcat for Danciger Oil & Refining Co. in southeastern Ector County, Texas. It is Danciger 1 Cowden, in Section 10, Block 42-2s, T.&P. Survey, 4 miles southeast of the South Cowden field.

Brewster-Bartle Drilling Co., Houston, Tex., has contract for Atlantic Refining Co. 1-A Denman Kountze, wildcat northwest of Markham, W. H. Gainer Survey 550, Matagorda County. Rigging up is about completed for the 10,000-ft. test.

Parker Drilling Co., Tulsa, has been awarded contract to drill two more deep tests in the South Louisiana district in two widely separated fields. At Bayou Sale field, St. Mary Parish,

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"The Bronze-Finished Scratcher with the Torque Springs"

BRUCE BARKIS — B and W, Inc. — KENNETH WRIGHT

Well Completion Specialists

WEST COAST: 3545 Cedar Avenue
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GULF COAST: 1105 Commerce Bldg.
Houston, Texas. Phone: Preston 9782

the company will drill Atlantic Refining Co. 8 St. Mary Parish Land Co., 1,750 ft. west and 1,075 ft. north of the southeast corner, 17-16s-9e, to 11,600 ft. In the Neale field of Beauregard Parish, Parker has contract to drill Atlantic 1 F. Thackery, 661 ft. south and 667 ft. east of the northwest corner, 35-3s-11w, to the Wilcox sands at around 12,000 ft.

Loffland Brothers, Houston, Tex., is the contractor on Continental Oil Co. 1 State-Calcasieu Lake, Lease 50, a wildcat in the southwestern part of Calcasieu Lake, and on the Calcasieu Lake dome, in Township 14s, Range 9w, Louisiana Gulf Coast. It is a 9,500-ft. test.

Fowler Drilling Co., Los Angeles, Calif., has been awarded a contract by Chanslor-Canfield Midway Oil Co. to drill a wildcat in the East Whittier district of California.

Harry Shulman, Kilgore, Tex., has contract to drill a 6,800-ft. wildcat test in Wood County, 3 miles north of Golden. It is W. A. Moncrief and C. E. Hyde 1 R. L. Simmons, Helena Nelson Survey, and will test the Paluxy sand.

Keyes Drilling Co., Denver, Colo., has received contract to drill Mutual Oil Co. of Kansas 1 Fletcher, SE SE SE 27-1s-46w, Yuma County, Colorado, wildcat operation. Last week, the contractor had practically completed rigging up rotary tools.

Wrather Drilling Co., Mount Carmel, Ill., has drilling contract on the Felix Jablonski 1 Yondorf, in NW NW 3-1n-9e, Wayne County, Illinois.

Grey Wolfe Drilling Co., Houston, Tex., is drilling below 3,500 ft. on a 10,000-ft. contract for Brown & Wheeler and W. J. Weaver (trustee) 1 Guy Gibson, a tight well in southern Navarro County, Texas.

Contractors Urged to Supply PAW Data on Shortage Of Drilling Material

DALLAS, Tex. — The American Association of Oilwell Drilling Contractors has distributed a questionnaire to the drilling industry, asking for information as to shortages of material the contractors are experiencing. Drilling contractors were urged to fill out these questionnaires and forward them to Glenn Campbell, chief of the priorities section, Petroleum Administration for War, Washington, D. C. If any items of equipment are slowing down operations, or if special services are not being furnished promptly causing delays in operations, the proper check mark should be made so indicating.

Information is also needed on tool-joint shortage. Contractors who have one or more rigs shut down for lack of tool joints are urged to supply the A.A.O.D.C. office in Dallas data on idle rigs, date they were shut down, location, date orders were placed for tool joints, number of delivery or purchase order, and make of tool joints ordered and with whom orders were placed.

The association is also calling attention to the transportation requirements of the War Manpower Commission, with regard to the negotiated transfer of personnel, to the drilling industry. The employer must refund to the employe his transportation expense on arrival at job location. Transportation expense shall consist of travel by railroad or bus and will allow $2.50 a day for meals and $2.50 a day for hotel. Transportation shall not exceed 2 days travel time. If personal car is used 3 cents a mile will be allowed.

It is imperative that drilling contractors file a Form 42-A for each man released from other defense jobs, for work in the drilling industry. This will preserve the returning employe's deferment status. The releasing employer is required to notify the employe's Selective Service Board that he is no longer engaged.

H. C. SMITH
ROCK BITS
Speed up the "hole job" and keep costs down

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GENERAL OFFICES AND PLANT
P. O. BOX 431 Compton, Calif.
Export Representative: Val R. Wittich
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Ease Out Casings . . . Fast!

Simplex Geared Jacks, 25 and 35-tons capacity

Both speed and ease in pulling casings and heavy lifting are provided by the powerful mechanism of Simplex Geared Jacks. Send for Bulletin "Oil-42" or ask your field store for Simplex Jacks.

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Chicago (44), Ill.
Better, Safer Oil Field Jacks Since 1899

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LEVER SCREW HYDRAULIC
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Make Your Jacks Last Longer! Send for helpful bulletin on the proper lubrication, care and handling of jacks.

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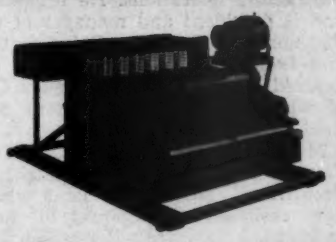
MUD SCREEN



Handles the output from 20" mud pumps after surface hole is drilled. Average capacity, 650 gallons per minute. Completely unitized. Screening surface—16 square feet. Domestic shipping weight less drive—1600 pounds. Headroom—37 inches. See Composite Catalog or write for details.

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ALHAMBRA, CALIF.
GULF COAST AND MID-CONTINENT REPRESENTATIVE
McNEELY MATERIALS CO.
2935 JENSEN DRIVE, HOUSTON, TEXAS

PERSONALS

Interest in Geologic Research Began In His Boyhood

HENDERSON COQUAT, active figure in oil operations of Southwest Texas, was drawn into the business through his interest in geologic research, which began when he was a boy. Fault lines which he observed on his father's farm in Live Oak County stimulated study which resulted eventually in naming the Gueydan formation. With Three Rivers, Tex., as his headquarters, Mr. Coquat has taken a leading part in drilling, developing, producing, and contracting operations. He organized and is president and manager of the Simmons Oil Co., Live Oak Gas Co., and Longhorn Drilling Corp. He organized also Moore Development Co., of which he is vice president and field manager.

Mr. Coquat was born in Live Oak County 50 years ago. His father, a Frenchman, bought the land which now embraces the Coquat oil field and settled on it when Henderson was 7. Besides his home in Three Rivers, Mr. Coquat maintains a residence in Austin and spends part of each year there. Week ends often find him hunting deer, wild hogs, panthers, and other game on one of his ranches near Cotulla, Tex. At longer intervals he gets over into Mexico to hunt lions and tigers. He enjoys fishing.

Mr. Coquat married Irene Murray, also a native of Live Oak County, and they have a daughter and two sons. "My single greatest achievement, and the one that has given me most pleasure," he said, "is the bringing in of what I consider a major oil field on my parents' land during my mother's lifetime."

Ivan Reddin, Island Development Co., in charge of drilling operations off Prince Edwards Island in the Gulf of the St. Lawrence; **Robert Seigel,** Socony-Vacuum Oil Co., Inc.; **R. V. Whetsel,** Cities Service Oil Co.; **C. A. Moon,** Socony-Vacuum Oil Co., Inc., and **H. J. Mackey,** witnessed the start of drilling operations at the unusual wildcat test which was described on page 16 of the November 18 Journal.

T. M. Cady, Kansas manager for operations of Texon Oil & Land Co., has been appointed superintendent of exploration and exploitation for that company in Texas and transferred to Fort Worth. The company is affiliated with Continental Oil Co. and has extensive production and undeveloped acreage in West Texas as well as in Kansas.

L. L. Aubert of Bankline Oil Co. and chairman of the wildcat committee of the California Oil and Gas Association, is making preparations for the annual Christmas High Jinks which will be held this year in the Biltmore Bowl December 15. It is hoped to raise $10,000 for the Red Cross to be used in permanent government hospitals in the Los Angeles area for disabled soldiers, sailors, marines and coast-guard men.

Lee R. Cowles, who was on leave of absence 18 months in order to serve as assistant director of transportation in the office of the Petroleum Administration for War, Washington, D. C., has resumed his position as traffic manager for Standard Oil Co. (Indiana), Chicago. **Robert W. Fyfe,** who filled Mr. Cowles' place, has returned to his regular post as assistant traffic manager.

Ralph L. Mathewson, formerly timekeeper for Shamrock Oil & Gas Corp., Sunray, Tex., and now a technical sergeant in the U. S. Army, has been transferred from Dallas, Tex., to Chanute Field, Illinois. Sergeant Mathewson entered military service in February 1941.

Wallace E. Pratt, vice president and chief geologist of Standard Oil Co. (New Jersey), New York, and **John R. Suman,** vice president in charge of production, Humble Oil & Refining Co., Houston, Tex., were elected directors of the American Institute of Mining and Metallurgical Engineers by letter ballot sent to the 12,000 members of the organization.

Hial B. Gernert, district superintendent for Texas Co. at Hamilton, Colo., has been transferred to Cut Bank, Mont. He is a graduate of the Colorado School of Mines.

WILLIAM M. PECK

William M. Peck, acting manager of the Illinois producing division, has been appointed manager of the Pure Oil Co. Michigan producing division with headquarters in Saginaw. He succeeds Edward F. Claggett, who died November 7. Mr. Peck started with the company as a roustabout in 1927. Mr. Peck's biography appeared in the November 11 Journal.

Earl B. Gilmore, president of Gilmore Oil Co., Los Angeles, Calif., producer, refiner and marketer, suffered a compound fracture of the left leg several days ago at Ely, Nev.

Chester Warlow, independent oil producer in the San Joaquin Valley district of California, has resigned as a director and trust officer of the Fresno branch of the Security First National Bank.

E. R. Stanley, California engineer, has renewed his contract with the Long Beach Harbor Department to supervise development of the harbor oil property on which approximately $21,000,000 has already been spent.

Lt. W. P. Heineman, formerly an assistant engineer in the general office of United Gas Pipe Line Co., Shreveport, La., is in training on the California desert.

Charles Albert Warner, director of Houston Oil Co. of Texas and chairman of the petroleum division of the American Institute of Mining and Metallurgical Engineers, was honor guest at a dinner given at the Houston Club last Friday by the Southeastern Texas section of the American Chemical Society. Following the

dinner Mr. Warner spoke on "History and Development of the Oil Industry in Texas."

Charles R. Canfield, of Stanolind Oil & Gas Co.'s geological department in the Midland, Tex., office for 2½ years, has been transferred to Wichita Falls, Tex., where he will be in charge of the district office recently opened there to handle geological work in North Texas.

Capt. G. O. Halsey, employed by Ohio Oil Co. in the Cement field, Caddo County, Oklahoma, before he entered the U. S. Army Air Corps, is stationed in England and recently received the Distinguished Flying Cross. Captain Halsey led 189 combat missions over Europe, and he has been awarded several medals and citations.

Overton Black, formerly a scout for Phillips Petroleum Co. in Oklahoma City, Okla., is now an independent operator in the Midland, Tex., area.

Ens. W. E. Garris, Jr., who was employed in the research laboratory of Lion Oil Refining Co., El Dorado, Ark., until he joined the armed forces, has been transferred from Tucson, Ariz., to Annapolis, Md., assigned to duty in the research laboratory of the U. S. Naval Academy.

Mac L. Coker, petroleum geologist of Austin, Tex., has been commissioned a first lieutenant in the Army Air Corps.

Ernest A. Hanson, formerly petroleum engineer with the U. S. Geological Survey in Roswell, N. M., has been transferred to Casper, Wyo.

Leonard E. Scott, engineer in the Dallas, Tex., district for United Gas Pipe Line Co., has been transferred to the San Antonio, Tex., district in the same capacity.

J. Duff Hatch, who has been doing geophysical work for Humble Oil & Refining Co. for several years, has been assigned to Midland, Tex., joining the staff of **S. S. Stinson,** chief scout.

Waite Phillips, whose name is closely associated with the history of oil developments in Oklahoma, was inducted into the Hall of Fame of the Oklahoma Historical Society in Oklahoma City last week.

Capt. William H. Vaughan, superintendent of the gas-utilization department of Tide Water Associated Oil Co., Houston, Tex., and his son, **Ens. William H. Vaughan, Jr.,** form a father-and-son team in military affairs. Captain Vaughan, formerly commander of Company D, Thirty-seventh Battalion, Texas State Guard, at Palestine, Tex., is now attached to the adjutant general's department of the guard. He served with the 336th Aero Squadron in World War I, and he is a member of the military affairs committee of the Houston Chamber of Commerce. Ensign Vaughan is is operational training at Sanford, Fla.

Ralph U. Fitting, Jr., production and appraisal engineer for Shell Oil Co., Inc., in its West Texas-New Mexico division office in Midland, Tex., for the past 5 years, has resigned and opened an office there as a consultant.

Joseph M. Wilson, independent operator, has been chosen in a mail ballot to serve as president of the Dallas (Tex.) Petroleum Geologists in 1944. He is now vice president, and **Henry C. Cortes,** of Magnolia Petroleum Co., was chosen to succeed him in that office. **H. C. Vanderpool,** Seaboard Oil Co., was elected secretary-treasurer, and **Cecil H. Green,** Geophysical Service, Inc., was named to the executive committee. These officers will assume their duties January 1.

C. C. Evans, for 10 years assistant superintendent of Republic Oil Refining Co.'s plant in Texas City, Tex., has been advanced to superintendent, replacing **C. E. Robertson,** who retired. **Russell Homsten,** process supervisor since 1939, becomes assistant superintendent in charge of operations, and **Louis Keller,** plant engineer since 1934, becomes assistant superintendent in charge of engineering and maintenance.

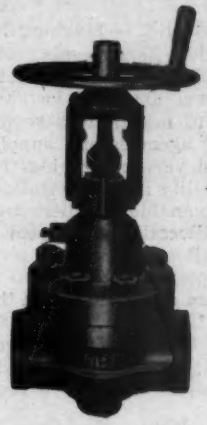
A. Roger Denison, of Tulsa, president of the American Association of Petroleum Geologists, with the other members of that organization's executive committee met this week in Dallas, Tex., for a discussion of plans for the annual convention of the national body, to be held in Dallas March 21-23, 1944.

Robert E. Hardwicke, Fort Worth, Tex., has been appointed associate chief counsel of the Petroleum Administration for War. He had served as a special consultant to PAW since January 1943.

George Hodges, formerly with the Texas-Gulf Production Co., Houston, Tex., has been appointed manager of Midstates Oil Corp.'s new Southwest Texas area and will be stationed at San Antonio. **Morris Cannan,** Midstates geologist at Alice, has been transferred to San Antonio. **M. M. Kornfield,** formerly consulting paleontologist and geologist, has joined the Midstates staff as district geologist in the upper Texas Gulf Coast and Louisiana coastal areas.

ORBIT VALVES

ARE BUILT TO "TAKE IT"



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(Screwed End)

ORBIT FLOW LINE VALVE

A full round opening valve that operates easily under high pressures. No grease required to effect a seal. Compact in design, yet built to "take it."

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will last for the duration. Meanwhile, if you have any questions regarding their care or maintenance, write us.

OIL WELL IMPROVEMENTS CO.

Since 1912

TULSA, OKLAHOMA

Market Developments

East Coast

NEW YORK. — Much-criticized Directive 59 governing the distribution of petroleum products in District 1 was amended last week after months of negotiations between government agencies and suppliers. The amended version provides for greater flexibility in the allocation system. Changes enable suppliers with insufficient allocations to appeal for additional allotments. The zoning system is retained but sales to the Navy have been eliminated from the definition of 1941 sales so that allocations are now based exclusively on civilian demand. Sales to specified federal agencies still retain their preferential status.

Price changes, intended to adjust quotations in areas affected by purely local factors, were permitted by OPA in a revised price schedule effective November 22. In a number of instances advances of 0.1 cent in No. 2, 3 and 4 fuel oil were authorized. The changes were effective at various points in New Jersey, New York and New England.

Another decline in supplies of residual-fuel oil has resulted in the recall of an order which permitted consumers, equipped to use either coal or fuel oil, to use fuel oil instead of coal. Reconversion to coal has not been required but no other consumers are being permitted to switch from coal to oil. Tightness in heavy fuel developed from the fact that supplies are so short in District 2 that shipment of this product from District 1 to the Middle West was necessary.

Pacific Coast

LOS ANGELES, Calif.—With another 1,000,000 bbl. reduction in gasoline stocks during October and a probable further decrease in stocks during November, it is obvious that corrective measures must be taken. In order to meet future conditions, California refiners face the necessity of increasing the movement of refined oil into the state or of diverting a portion of the Pacific military demand to the Gulf Coast or foreign areas.

Pacific Coast marketers started last week rationing gasoline dumps to not more than 80 per cent of the August-September average sales. This practice leaves the door open for possible charges of favoritism, or, as one marketer put it, "kissing off" unprofitable accounts.

Sales of gasoline in the spot market reached a new low this week and the future appears clouded although it is possible that retail prices of independent gasoline must be increased to the ceiling established by major competitors. The increased delivery costs cannot be made up any other way and at the same time provide dealer margins.

Mid-Continent

MODERATE recession in the demand for gasoline in the past week was characterized as seasonal, accentuated by the cold wave which gripped much of the country. Winter temperatures and snowstorms which prevailed in Iowa, Minnesota and other areas in the sales territory of Mid-Continent refiners and marketers caused a marked drop in motor-fuel demand, and effects of curtailed consumption continued to be noticeable this week. Contributing to the diminished demand was the usual seasonal decline in rural regions which attends completion of fall plowing and other farm work. However, with refiners turning away buyers and with meager working stocks in the tanks, the current falling off in civilian demand has merely given refiners and marketers a chance to catch their breath.

Heavy lubricating oil, ordinarily showing signs of softness at this time of the year, was scarce and firm, with little, if any, obtainable at under-ceiling prices. Light oils were easier, and buyers said it was possible to pick up small lots here and there below the ceiling. Bright stocks, which in recent weeks had been extremely tight, were loosening up slightly, but still not easy to find, and some suppliers said they were a week or 10 days behind on shipments.

Vigorous demand was reported for all burner oils and for kerosene. Kerosene ranked close to gasoline in point of tightness. All the heating oils were in active demand. Although supplies in the northeastern states were reported to be large enough to tide domestic consumers over the current cold wave, they were about 60 per cent normal, and brisk inquiries from that area were reported.

Natural gasoline continued to exhibit all the strength it has shown for weeks, with prices unchanged.

Gulf Coast

HOUSTON, Tex. — Substantial changes in the current scheme of distributing petroleum products from Gulf Coast refineries may develop when the War Emergency Pipelines, Inc.'s 20-in. products line to the East Coast is placed in operation. Discussions in trade circles speculate on the prospect that part of the 20-in. throughput, originating chiefly in the Gulf Coast, will be stopped in the Middle West to bolster lagging supplies in the Middle West. Certain Middle West suppliers are reported here to be actively campaigning for the diversion of WEP products at Norris City, Ill., or other Middle West points.

Gulf Coast refiners, of course, would be called upon for coastwise shipment of sufficient products to offset the bulk diverted in the Middle West. Chief concern among plant operators in this territory continues to center on maximum utilization of facilities for manufacture of war products. Additional supplies of isobutane are reaching Gulf Coast refineries, permitting increases at several points in the manufacture of aviation gasoline. New cycling plant capacity is becoming available for increasing the recovery of isobutane and several natural-gasoline plants are starting operation of new splitters installed to segregate normal butane and isobutane.

A.P.I. REFINERY REPORT

Week Ended November 13, 1943

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	137	2,280	320	1,055
Ind., Ill., Ky.	736	13,077	3,803	6,809
Okla., Kan., Mo.	350	6,800	1,215	2,498
Censored area*	2,094	30,584	18,398	22,710
Rockies	105	1,144	711	419
California	712	14,751	39,000	11,985
Total 11-13-43	4,134	68,726	62,647	45,316
Total 11- 6-43	4,079	68,698	63,551	44,776
Total 11-14-42	3,802	76,028	76,543	50,533

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
November 13, 1943	238,404,000
November 6, 1943	236,937,000
November 14, 1942	235,282,000

*Excludes unrefinable California stocks.

Refinery Prices

(Prices as of November 23, 1943)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	74-76	70-72	68-70	63-66
Mid-Continent*	.....	.....	6.000	.....	5.625
Pennsylvania	.....	6.750-7.000	.....	.....	.....
Gulf Coast	6.00-6.50	.....	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	.....	9.2	9.2	.....
California	6.750-7.500	6.250-6.500	6.125-6.250	5.750-6.125	5.125-5.500

*Basis Group 2. †1939 C.F.R. (research method). §Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	4.125	.....

*Basis Oklahoma Group 3.

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Residual Bunker C‡
Mid-Continent*	4.125	.....	.....	.....	.....	$0.80-1.27
California	.....	2.750-4.000	.....	.....	†1.35-1.45	1.10-1.15
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85-1.27
Northeast Coast	.....	.....	.....	6.800	2.780	1.65-2.07
North Louisiana	.....	.....	.....	.....	.....	0.80-1.27

*Basis Oklahoma Group 3. †Gravity range ‡Pacific Specification 200

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625	3.500	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	‡1.10-1.25	‡1.10-1.15
Gulf Coast	3.750-3.875	.....	1.35	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300. §Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D. 10-25		27.00
150-160 D, 0-10		23.00
120-125 D, 0-10		22.00
Steam refined:		
600 dark green (untreated)		9.00
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 6 color, 140-150 at 210, 545-550 flash)		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	19.50

Neutral Oils

Vis. at 100° F. (except Pennsylvania and color N.G.A.)		
OKLAHOMA (Group 3)—		
0-10 pour point:		
200-3		15.00
300-3		18.00
500-3		19.50
600-3		20.00
Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.		
CALIFORNIA—		
200-2½-3	7.00	7.75
460-3-4	7.25	8.00
600-3-4	8.75	11.00

Neutral Oils

200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		37.50
10 pour point		36.50
15 pour point		35.50
25 pour point		30.00
200 vis. at 70° F., 3 color:		
Zero pour point		39.50
10 pour point		38.50
15 pour point		37.50
25 pour point		32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.s. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150
Crude scale:	
124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND

(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.50	10.50
Boston, Mass.	14.90	4.50	10.10
Burlington, Vt.	16.90	5.50	10.30
Buffalo, N. Y.	16.20	5.50	10.90
Dover, Del.	16.70	5.50	12.30
Hartford, Conn.	15.60	4.50	10.00
Manchester, N. H.	17.30	5.50	12.10
Newark, N. J.	15.20	4.50	10.00
New York, N. Y.	16.10	5.50	10.10
Philadelphia, Pa.	16.30	5.50	11.90
Pittsburgh, Pa.	16.70	5.50	12.30
Portland, Me.	16.30	5.50	10.30
Providence, R. I.	15.00	4.50	9.90
Washington, D. C.	15.30	4.50	11.30
Average 14 cities	16.02	5.14	10.95

(All prices undivided dealer basis.)

CENTRAL

(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co. and Texas Co.)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Chicago, Ill.	14.10	4.50	10.00
Cleveland	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	10.10
Detroit, Mich.	14.40	4.50	10.00
Fargo, N. D.	16.90	5.50	11.60
Huron, S. D.	16.30	5.50	11.00
Indianapolis, Ind.	15.60	5.50	10.10
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.90
Minneapolis, Minn.	15.90	5.50	10.60
Omaha, Neb.	15.40	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	13.30	4.50	8.70
Average 14 cities	17.46	5.37	9.84

*Includes 1-cent state tax.

SOUTHEASTERN

(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	...
Charleston, W. Va.	19.25	6.50	13.30
Charlotte, N. C.	20.10	7.50	11.30
Jacksonville, Fla.	18.90	8.50	9.50
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	17.90	8.50	10.50
New Orleans, La.	17.75	8.50	10.00
Norfolk, Va.	17.45	6.50	12.30
Average 11 cities	18.34	7.50	10.50

*Includes 1-cent state tax.
†Includes ½-cent state tax.

MIDWESTERN

(Continental Oil Co.

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	13.00

PACIFIC COAST

(Standard Oil Co. of California)

	Dealer tank wagon	Com-bined tax	Kero. tank wag.
Portland, Ore.	17.00	6.50	13.00
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.00
Average 3 cities	16.17	5.83	13.03
Average 50 cities	16.39	5.96	10.92

Illinois Fields

(Continued from page 106)

Mohawk Drilling Co. and Central Pipe Line Co.'s 1 Herold Pepple Community, 9 miles east of Mount Vernon, in Jefferson County, was estimated as a 700-bbl. well. The test, in C NE NW 24-2s-4e, produces from McClosky lime at 3,086-93 ft., which has been acidized. It was not yet on the completion list.

A wildcat in Edwards County, Superior Oil Co. 1 Lydia Lipper, NW NE SW 28-1s-14w, was swabbing 150 bbl. per day while cleaning out. The pay, Cypress sand, lies at 2,697-2,835 ft., total depth 3,091 ft.

ILLINOIS WILDCAT COMPLETIONS

Clinton County: H. B. Horner 1 Means, NW SW SE 26-2n-2w, dry at 1,406 ft.

Franklin County: Nash Redwine 1 and Sohio 1 Eva Taylor, SE SW NW 21-5s-3e, pumped 199 bbl. Cypress sand 2,534-44 ft. Pool opener.

National Petroleum Association 1-B Cook, NE NW NE 4-6s-2e, dry at 2,904 ft., upper Glen Dean 2,148 ft., Benoist 2,605 ft., Aux Vases 2,662 ft., McClosky 2,872-78 ft.

Wayne County: R. B. Martin 1 Musgrave, C SE SE 25-2s-7e, dry at 3,548 ft., Menard 2,545 ft., Cypress 3,012 ft., Ste. Genevieve 3,384 ft., Fredonia 3,446 ft.

White County: Seaboard 1 Ivan White, SW NW SE 3-5s-9e, dry at 2,748 ft., upper Kinkaid 2,115 ft., upper Menard 2,489 ft., Tar Springs 2,615 ft., Glen Dean 2,713 ft. and 2,730 ft.

Ohio Fields

(Continued from page 106)

Welker & Kennedy Consolidation in Section 25, Liberty Township, Guernsey County. The sand was found at 3,289-99 ft. and gauged 3,450,000 cu. ft. of gas daily.

OHIO WILDCAT COMPLETIONS

Lorain County, Eaton Township: Ohio Fuel 1 Schneider, Lot 90, Clinton 2,421-23 ft. 235,000 cu. ft. gas, T. D. 2,456 ft.

Muskingum County, Wayne Township: Atha Realty 1 Woerner Sec. 7, Clinton 3,720-32 ft., 1,700,000 cu. ft. T.D. 3,732 ft.

WESTERN KENTUCKY

OWENSBORO, Ky.—Only routine completions in developed areas in western Kentucky were reported during the week. Seven miles west of Henderson, in that county, Wood & Lacy et al 2 Bauldauf swabbed 15 bbl. an hour while testing Tar Springs sand at 1,862-71 ft. The test is 4 miles from other production. Wood & Lacy 1 Bauldauf, a location north of No. 1 was making a pumping test of Tar Springs sand at 1,873-87 ft. and was producing about 15 bbl. of oil and 85 bbl. of water per day.

INDIANA

EVANSVILLE, Ind. — A 211-bbl. completion of Superior Oil Co., 3 Thompson unit, SE SW NE 25-2s-12w, Gibson County, in Cypress sand at 1,974-88 ft., was the sole new well of the week reported from Indiana fields.

Oklahoma

(Continued from page 106)

The company has announced that the well will be completed at 250 bbl. a day, the high gas-oil ratio making it impossible to deepen and further test the sand. A 4-in. pipe line is being laid from the Oklahoma City field. An east offset to the discovery, in NE SW SE 29-10n-3w, is getting under way.

Payne County. — On the southeast edge of the old Ingalls area, J. E. Crosbie, Inc. 1 Myatt, NE SW 25-19n-4e, flowed 418 bbl. of oil in 2½ hours through tubing. Misener sand was topped at 3,730 ft. and perforated at 3,750-56 ft. Total depth is 3,774 ft.

OKLAHOMA WILDCAT COMPLETIONS

Lincoln County: Mid-Continent 1 Markwell, SW SE NE 32-12n-4e, dry, T.D. 5,685 ft., Bartlesville 4,755 ft., Viola 5,495 ft., Wilcox 5,592 ft.

McIntosh County: W. H. Pine 1 Lynn, SE SW SW 35-11n-15e, dry, T. D. 1,905 ft., Booch 1,104 ft.

Payne County: Wood Oil 1 Perswell, NW NW SE 12-18n-5e, dry, T.D. 3,463 ft., recovered 150 ft. of oil on D.S.T. in Layton sand at 2,086-2,120 ft., show gas in Skinner at 3,071 ft.

Pottawatomie County, 2 mi. W of Asher area: Watchorn Oil & Gas 1 Sorrell, NW NW SE 20-6n-3e, flowed 639 bbl. oil in 24 hr., 1/16-in. choke, 39 gravity at 62, pay zone Viola 4,140 ft., T.D. 4,695 ft., perf. at 4,140 ft. and flowed 237, 198 and 186 bbl. in 3 1-hr. tests.

Kansas

(Continued from page 107)

King County: Vickers Pet. 1 Ralls, SW SW NW 8-30-8w, dry, T.D. 4,700 ft., Viola 4,478 ft., Simpson 4,532 ft. Arbuckle 4,648 ft., est. 1,000,000 cu. ft. gas at 4,165-4,202 ft.

Osborne County: Paul J. McIntyre 1 Applegate, SW SW 11-10-12w, dry, T.D. 4,026 ft., Viola 3,791 ft., Simpson 3,910 ft., Arbuckle 2,969 ft.

Pratt County: Shell 1-A Stoops, SE SE SW 7-29-12w, dry, T.D. 4,731 ft., Viola 4,446 ft., Simpson 4,537 ft., Arbuckle 4,680 ft.

Rice County: Phillips 1 Volk, NE NE SW 27-18-9w, pumped 126 bbl. in 8 hr., potential 2,364 ft., Arbuckle 3,236-56 ft., T.D. 3,275 ft., discovery of Volkland pool.

Magnolia Pet. 1 Schoonover, SW NW SW 24-18-9w, dry, T.D. 3,380 ft., Viola 3,288 ft., Arbuckle 3,356 ft.

Saline County: Flynn Oil and Broswood Oil 1 Hester, SW NE NW 5-16-1w, dry, T.D. 2,653 ft., Kansas City 1,975 ft., Mississippi lime 2,616 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the lands herein described within the known geologic structure of the Elk Basin field, Montana, are offered to qualified bidders of the highest amounts offered per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. 226), in the following parcels, all in T. 9 S., R. 23 E.: Parcel No. 1, lot 8 sec. 34, embracing 21.64 acres; Parcel No. 2, lot 9 sec. 35, embracing 11.48 acres; Parcel No. 3, lot 10 sec. 35, embracing 1.11 acres; Parcel No. 4, lot 11 sec. 35, embracing 3.96 acres; Parcel No. 5, lot 12 sec. 35, embracing 2.92 acres; Parcel No. 6, lot 13 sec. 35, embracing 2.66 acres; Parcel No. 7, lot 5 sec. 36, embracing 31.81 acres. Sealed bids will be received in the office of the Secretary of the Interior, Interior Building, Washington 25, D. C., up to 12:00 (noon) November 29, 1943. Bids must be submitted on each parcel separately, but if two or more parcels in sec. 35 are awarded to the same bidder, they may be included in a single lease. Each bidder must submit a certified check or cash for one-fifth of the amount bid, payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre, must be paid and a $5,000 corporate surety bond must be furnished by the successful bidder prior to the issuance of the lease, and the deposits of the other bidders will be returned. The envelopes should be plainly marked "Bid for Parcel No. ——, Elk Basin Field. Not to be opened before noon November 29, 1943." No bid received after the time fixed herein for submitting bids will be considered. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

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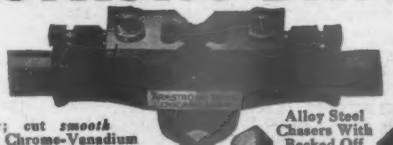

Cut faster, easier; cut *smooth threads*. Dies are Chrome-Vanadium Steel, have backed-off teeth, correct Cutting Angle, correct Throat Angle and Ample Chip Clearance.
Free from ridges and corners. Stocks fit comfortably in hand, are balanced, are accurately machined inside. Take all dies.
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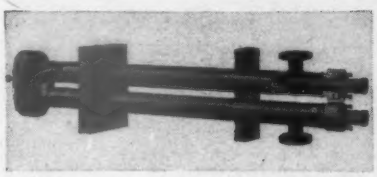
Equipment Progress

Improved "Sectional" Heat Exchanger

Brown Fintube Co., Elyria, Ohio, has introduced a new and improved construction of the "Sectional Hairpin" heat exchanger.



Featured in these new exchangers is a nonremovable rear-end assembly. The operator is required only to remove the bolts—back the cover plate off far enough to clear the plates of the adjacent "section" — then swing the plate through a 180° arc, and rebolt it in this position, to gain clear, unobstructed entrance into the exchanger.

The new head seal introduced in these new exchangers, consisting of a solid ring and two split collars tightened with cap screws, can be assembled easily with only a conventional 8-in. crescent wrench. These new exchangers have welded one-piece "hairpins" which positively prevent any mixing of the tube-side and shell-side commodities—and through the use of Brown Fintubes assures users of high thermal efficiency and trouble-free operation.

Giant Antifriction Bearings

Antifriction bearings 10 ft. in diameter, made by the Bantam Bearings

division of Torrington Co., present a unique and interesting contribution to the war effort. These huge races machined and ground to precision limits of .002 in. in diameter and .001 in. in parallelism, are for the 5/38-in. Cal. twin antiaircraft gun mount for the Navy. This includes one race which is 1⅞-in. wide and ¾ in. in cross-section, and another race 1¼-in. wide and 2½-in. in cross-section.

Races of this thin cross-section presented many problems, not only in manufacturing but also in inspection, because in measuring such large diameters, the usual micrometer gages were not satisfactory. For instance, a variation in temperature of 2° F. between the gage and the race would result in a variation of approximately .0016 in. and, as mentioned, the total tolerance allowed is only .002 in.

Thornhill-Craver Machinery Only Slightly Damaged

HOUSTON, Tex.—Fire, which swept the Thornhill-Craver Manufacturing Co.'s plant here November 17, although destroying buildings, only slightly damaged machinery used in making oil-field equipment and essential war materials. With power promptly restored and quick improvisions in housing made, almost full operations have been resumed. Stocks of finished products were undamaged. The fire was accidental.

New Type Motor Announced By Fairbanks-Morse

Fairbanks-Morse & Co., Chicago, Ill., announced a new type, all-purpose, continuous - duty, polyphase squirrel-cage induction motor for use in all kinds of industry.

This new motor is "protectioneered" and according to the company, embodies many special and vital features.

Constructed with the centrifugally-cast F-M Copperspun rotor, this new motor is fully protected against flying chips, falling particles, dripping liquids, and other industrial motor hazards. The ball bearings sealed in cartridge - type housings minimize expensive shut-downs due to bearing failures. Cross-flow ventilation, a feature in frames 224 to 365 inclusive, is obtained through protected inlets and exhausts at each end of the motor—resulting in uniform cooling and the elimination of hot spots.

Regardless of the position of the motor, complete safety for the operator is assured because there are no moving external parts. The frame is cast in one piece with rib sections to give added strength without increase in weight.

The new motor also incorporates an innovation in conduit boxes. Where space is limited, the conduit can be brought up between the motor feet to the tapped hole in the motor frame and the conduit box cover assembled flush with the frame. The external box is then discarded. When the conventional conduit box is used it can be mounted in any one of four positions.

It is rated 40°C and designed to carry 115 per cent load continuously without injurious heating (1.15 per cent service factor).

Chiksan Awarded Army-Navy "E" Pennant

Chiksan Tool Co., Brea, Calif., was awarded the Army-Navy "E" pennant for excellence in war production at formal ceremonies at the Chiksan plant on Friday, November 19. Presentation was made by Rear Adm. J. R. Defrees, U.S.N. (retired). W. Edgar Spear, president of Chiksan, accepted the award in behalf of all Chiksan employes. "E" pins were presented by Lieut. Col. Henry E. Beal, U.S.A., and accepted by Van J. Kubin, oldest employe. Chiksan manufactures swing joints and oil tools.

Le Roi Co. Receives "E" Award

Taking its rank among other companies who have been thus honored, Le Roi Co., Milwaukee, Wis., has been given the Army-Navy "E" Award.

The award of the burgee was made by Brig. Gen. Raymond A. Fowler, Assistant Chief of Engineers, U. S. Army. The "E" emblems were presented to the employes by Com. H. O.

Lord, Assistant Superintending Civil Engineer, Area V, Chicago, Ill.

Other participants in the program included C. W. Pendock, president of Le Roi Co., who accepted the banner in behalf of the employes; Anthony Bieniewski, cochairman of the Labor-Management War Production Drive Committee, who accepted the "E" pins for the employes; Leon F. Foley, master of ceremonies, and Lt. Col. the Reverend Gustav Stearns, Chaplain, U. S. Veterans Administration, who pronounced the invocation.

Trade Literature

Oakite Products, Inc., 22 Thames Street, New York, N. Y.—A 16-page digest which concisely describes 65 problems and jobs that commonly occur in power-plant maintenance. Various methods are outlined, materials and amounts used given, results obtained and advantages gained. The manual contains many useful diagrams and hookups successfully being used for cleaning and descaling heat-exchange equipment.

Bridgeport Brass Co., Bridgeport, Conn.—A 112-page Condenser Tube Manual, which fulfills the need for a compact reference on tubes and condensers, heat exchangers and evaporators in power plants, ships, oil refineries and process industries. The manual contains the latest A.S.T.M. and federal specifications on standard alloys, comprehensive weight tables, steam notes, methods of installing and packing.

Laughlin Co. Awarded Pennant With Star

Thomas Laughlin Co., Portland 6, Me., manufacturers of wire rope and chain fittings for the Navy and Merchant Marine, has been awarded the pennant with one star which will shortly be flying above its Army-Navy "E" Award.

Slaughter Elected Vice President of Girdler Corp.

John E. Slaughter, Jr., has been elected to the vice-presidency of the Votator division of Girdler Corp., Louisville, Ky. For the last 5 years he has been sales manager.

He is a graduate of Male high school in Louisville, and of University of Virginia.

Spang-Chalfant Makes Changes in Field Organization

Spang-Chalfant, Pittsburgh, Pa., announces as of November 1, 1943, the following changes in its field organization.

H. G. Texter will return to his former headquarters, Tulsa, to resume his activities as chief field engineer.

George M. Eaton, who for many years represented the company as field engineer in California, with headquarters at Los Angeles, is retiring and will be succeeded by James A. Kennedy, who is being transferred from Tulsa to Los Angeles.

N. A. Rebarick, who during the past several years has held various positions in the operating department at the company's seamless tube mill, Ambridge, Pa., will succeed Mr. Kennedy as field engineer with headquarters at Tulsa.

Among Equipment Men

New Officers Elected by American Welding Society

During the twenty-fourth annual meeting of the American Welding Society at Hotel Morrison, Chicago, Ill., the following officers were elected for 1943-44:

DAVID ARNOTT

ISAAC HARTER

A. C. WEIGEL

President, David Arnott, American Bureau of Shipping, New York, N. Y. He has been active in the society since its early days, particularly in its technical activities relating to ship welding; first vice-president, Isaac Harter, vice-president of Babcock & Wilcox Co., Barberton, Ohio. He was closely associated with the beginnings of the A.S.M.E. Boiler Code and the corresponding Code of the State of Ohio, and with the acceptance by the U. S. Navy of welding for its pressure vessels; second vice-president, A. C. Weigel, vice-president, Combustion Engineering Co., Inc., New York, N. Y. In addition to being a member of the society and its executive committee, Mr. Weigel is also a member of the A. S. M. E. Boiler Code Committee, Newcomen Society and other technical societies.

Directors at large elected include H. W. Pierce, assistant to general manager, New York Shipbuilding Corp., Camden, N. J.; E. R. Seabloom, supervising engineer, Research and Development Laboratories, Crane Co., Chicago, Ill.; K. V. King, materials engineer, Standard Oil Co. of Calif., San Francisco, Calif.; and J. H. Deppeler, chief engineer, Metal & Thermit Corp., New York, N. Y.

District vice presidents include: New York and New England—F. C. Fyke, head, materials division, general Engineering Dept., Standard Oil Development Co., Elizabeth, N. J.; Middle Eastern—C. H. Jennings, section engineer of welding sections, Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.; Middle Western—G. N. Sieger, president and general manager, S-M-S Corp., Detroit, Mich.; Southern—E. C. Chapman, metallurgist in charge of welding research, Hedges - Walsh - Weidner Division, Combustion Engineering Co., Chattanooga, Tenn.; Pacific Coast—J. C. Gowing, Southern California representative, Hobart Brothers, Los Angeles, Calif.

The election of officers concluded the meeting which was held October 18 to 21.

Wiese Elected Lukens Steel Vice President

J. F. WIESE

J. Frederic Wiese has been elected a vice president of Lukens Steel Co., Coatesville, Pa., and will be in charge of the combined sales of Lukens and its two subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

Since June 1939, Mr. Wiese has been general manager of sales of Lukens Steel Co. and in 1940 was appointed manager of combined sales for Lukens, By-Products and Lukenweld.

In August 1926, Mr. Wiese joined Lukens Steel Co. and has served continuously in its flanging, railroad and general sales departments, with the exception of a period of one year in 1928.